

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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New Tools for Hardware Manufacturers.

We illustrate upon this page several new tools for hardware manufacturers, built by Mr. John Adt, 22-26 Artisan street, New Haven, Conn. One of the most interesting of these is the Automatic Wire-forming Machine, designed for cutting and forming No. 7 and smaller wire into various shapes, such as rings, buckles, fence bars, hooks and an almost endless variety of similar articles. It is furnished with three or more forming motions for bending or stamping wire around a central former. Articles which by the common methods of manufacture frequently require to be handled several times can be made on this machine at a rate varying from 75 to 175 per minute. The wire is taken directly from the reel. In some instances, as in the case of hog rings, the speed is as high as 200 per minute. The same style of machine can be furnished capable of handling heavy wire.

The Automatic Wire-straightening, Cutting and Milling Machine is intended for making butt pins, bolt shanks and similar articles. It has attachments for milling one end to a point or shoulder, and flattening, bending, squaring or nicking the other end, as may be desired. These attachments may be detached at the pleasure of the operator and the machine used for ordinary wire cutting.

The three upper engravings on the page represent two drilling machines and one heading machine, all of them convenient and useful machines for the hardware manufacturer. We first notice the Upright Butt and Hardware Drilling Machine. This machine is designed for drilling door butts and general hardware. At the top and front is a sliding carriage or chuck for holding the work; at the bottom is a drill spindle, with a protection to prevent chips getting into its bearings. The carriage is operated by a steel-feeding screw in the rear, running through a split nut, which is connected with a small lever. The operator, after placing the article to be drilled in the chuck, starts the machine by closing the nut with a slight motion of the lever; the carriage then moves toward the drill and continues until it has reached the proper depth (which is regulated by a sliding gauge on the side of the machine), when the nut instantly opens and allows the carriage to slide back to its former position. It is so arranged that should the drill become dull before reaching the proper depth the feed will stop and the carriage slide back immediately. Both the spindle and feed screw are run by belts from horizontal counter-shafts in the rear of the machine. One boy can operate from six to ten machines. Where there are more than six used they are placed upon an iron bed by the manufacturer, and a considerable reduction in the cost of each machine is effected.

The Elastic Blow Riveting Machine has many advantages over hand work, both in the quantity and quality of the work which it does. It is in constant use in many of our large manufacturing establishments, doing a great variety of work. These machines are likely to become very popular on account of

moving the work in any manner. Mr. Adt says of this machine: "These machines are built of first-class stock and workmanship, and a boy or girl can run them and do more and better work than the most skillful operator can by hand." A self-acting device attached to the machine stops instantly the blow of the hammer, allowing the operator to withdraw his work, and does away with the need of lowering the work from the ham-

is intended for drilling and countersinking several holes at once on a regular or irregular line. It is very useful on general hardware, such as butts, strap and T-hinges, door bolt plates, shelf and wall brackets, harness, coat and hat hooks, &c., &c. The machines can be made with any number of spindles, but the manufacturer considers the 6-spindle machine the most generally applicable. The drills can be adjusted very close to each

mends that a sort of agricultural bureau be established in the same connection, where manufacturers' catalogues and other means of diffusing information could be deposited, and where all needed explanations could be given.

Rich Field for American Exports.

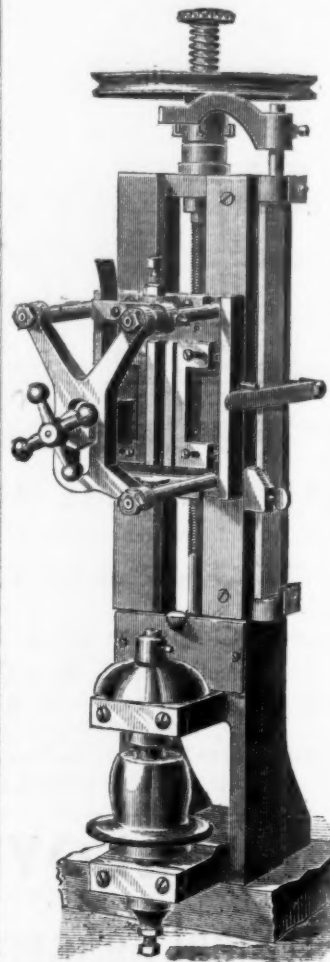
Mr. Henderson, our Consul at Amoy,

yards are required annually to cover their nakedness. The import of all cotton goods to China in 1866 was 641,760,960 yards, or enough, if it was all used for clothing, to supply 32,088,048 people. The immense balance, 7,358,239,040 yards, wanted for 368,000,000, is made of native home-spun wool and foreign warp, or wholly of native home spun yarn, and woven on hand looms that have come down from prehistoric times. Admitting that modern spindles and looms can produce a better article and lay it down in China for less money, foreign cloth must invariably displace the native fabric with all but the few who, for want of better employment, will continue to spin and weave their own—a number already small comparatively in the tea-producing districts of the country, where a more agreeable and profitable labor than weaving and spinning is found for the women and children in picking and preparing tea." He appears to think there are good prospects for capturing some of this enormous trade, as the English are not so good as the American cottons, which, if once fairly introduced, would drive the former from the market.

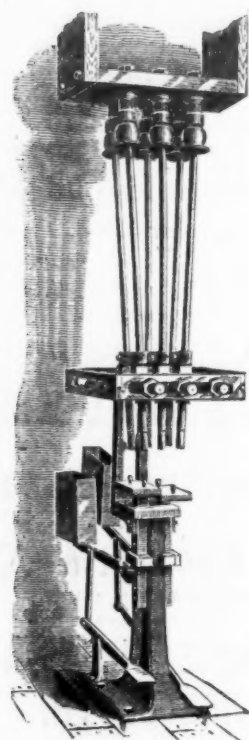
In reference to the introduction of American goods generally, he says: "On this side we want more American merchants and agents of modern business ideas and habits, whose nationality is American in reality, whose interests are in American commerce, and whose wishes and sympathies are for its success, exercising the necessary energy and ability to properly display the superiority of American goods. Many of the Americans I have met in this country gave out the appearance of possessing but little education beyond what they had picked up in some English tea house. They know nothing and care nothing about American institutions, resources, or commerce disconnected with the tea trade, and often are given to too much of that toadyism to English ideas and prejudices which marks a peculiar type of the *civis Americanus* to be fit representatives of American houses."

Two items in the foreign dispatches are significant of the condition of commerce and trade abroad. Forty thousand workmen on the Clyde have to submit to another reduction of wages, after being defeated in the long lock-out within the last two years. The months that they were idle seem to have been of no avail, and now they have to come to another cut. Then there is the report of the failure of a large Manchester house, in trying to introduce their goods into China and India. The day is past when England can sell her goods in China in competition with those of American manufacture. John Chinador is getting wiser every day, and he knows where he can buy the best and cheapest.

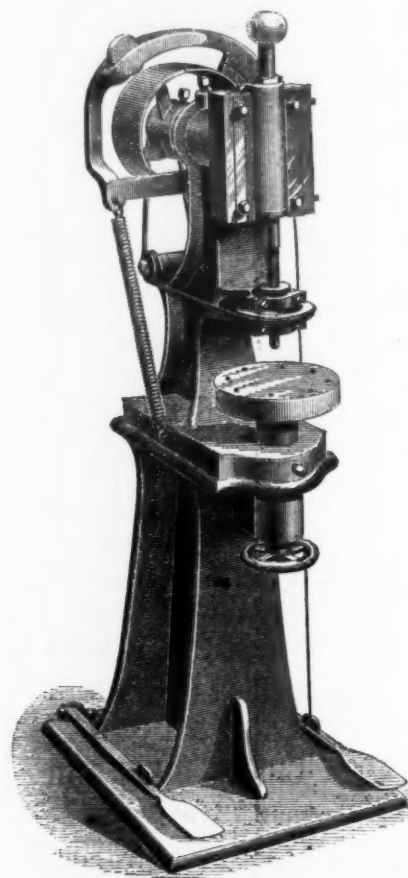
Another of those conflagrations which have given the oil regions of Pennsylvania such an unenviable notoriety occurred on Sunday week, when the town of Edensburg, Clarion county, was virtually laid in ruins. In less than three hours the buildings, covering 30 acres of ground and numbering some



Upright Butt and Hardware Drilling Machine.



Drilling and Countersinking Machine.

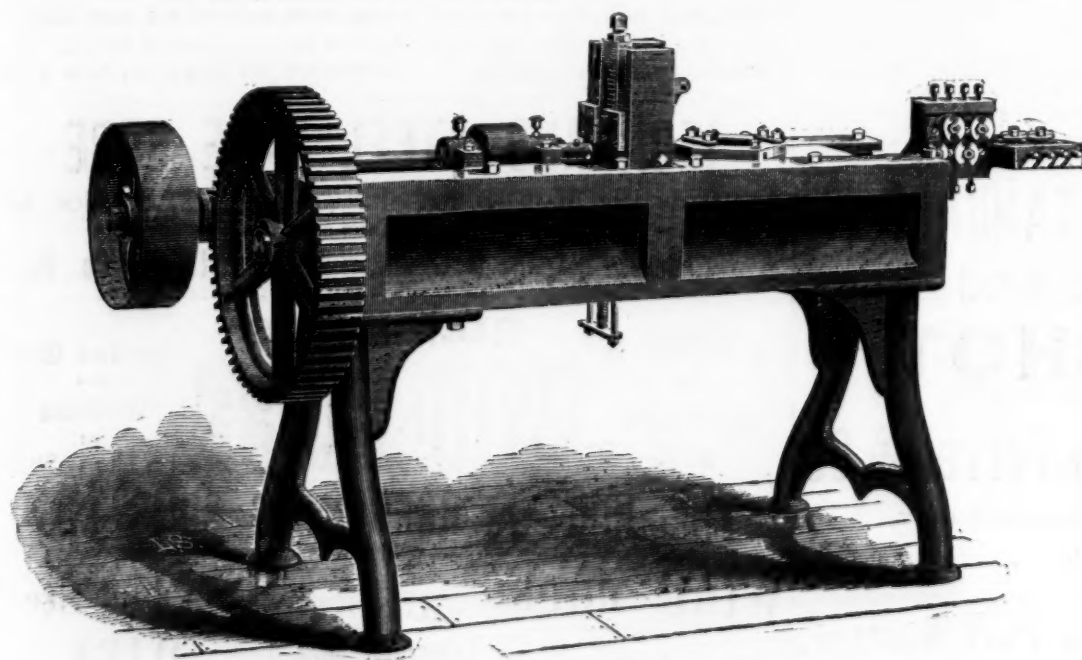


Elastic Blow Riveting Machine.

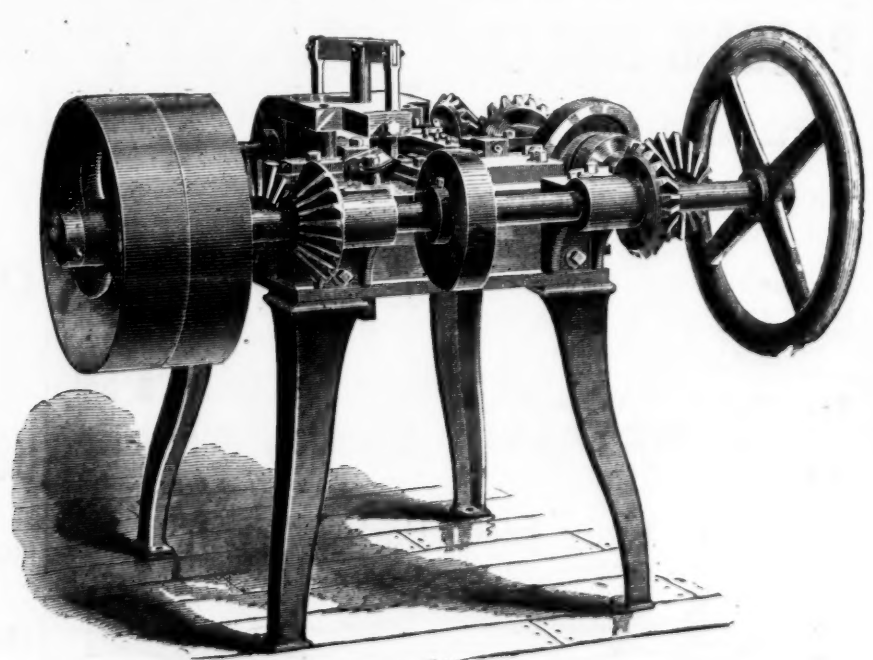
mer when changing from one piece to another. An adjustable anvil allows chucks or other devices to be attached for holding work of different shapes and thicknesses, and an extra treadle (shown in cut) is furnished with each machine, to allow these chucks to be operated by the foot if desired. Chucks can be had to hold any specified work at a small additional cost, the price varying with the peculiarities of the work to

other, or several inches apart, while the machine is running. The spindles are suspended from a frame fastened to the ceiling, and power is applied to the upper ends by means of belts from horizontal counter-shafts. The machine can be worked by one or two operators, having two independent table slides; each one of two operators can use a number of spindles to suit his work, or one can use both tables and do two different

China, sends to the State Department a long report on the prospects of trade with that country, particularly in cotton goods, which are now almost wholly supplied by England. The statistics so easily obtained in Western countries are not available in China, and therefore it is from personal observation and information obtained in long journeys through the country that Mr. Henderson speaks: "I do not hesitate to say that there is not



Automatic Wire Straightening, Cutting and Milling Machine.



Automatic Wire Forming Machine.

SOME NEW TOOLS FOR HARDWARE MANUFACTURERS, BY MR. JOHN ADT.

the great number of articles in which fastening by rivets can be made useful, as in sash and curtain fixtures; side, screw and axle pulleys, furniture casters, locks, knobs, tassel hooks, coat and hat hooks, shutter bars, &c. These machines strike from 800 to 1000 blows per minute, the number depending upon the size of the machine, and the heading of a rivet is nearly instantaneous. One of the most desirable features of these machines is in the elastic character of the blow, the force of which can be varied at will by the operator by merely varying the pressure on the treadle and without

be held. The work, while in the machine, is stationary, thus insuring of the hammer always striking on the rivet and heading it equally. Both hands of the operator being free, allows him to handle the work with ease and rapidity. The hammer being oscillated while the blows are given, the work can be riveted flush, or with a smooth, rounded head, as desired. The letter "A" machine will head rivets up to one-quarter inch, the "B" machine up to three-eighths of an inch and the "C" machine up to one-half inch.

The Drilling and Countersinking Machine

kinds of work at once, or use all the spindles on one table.

Practical Tests of Agricultural Implements.—M. Jacobo Baiz, Consul General for Guatemala and Salvador, in a conversation with a representative of *The Iron Age*, again urges the importance of establishing small model farms under the direction of the United States consular agents, where the value of all sorts of implements can be demonstrated. In the South American republics a much larger demand would spring up if this could be done. He also recom-

only ample room here for an increase of our trade in the articles of foreign manufacture that are already known and to some extent used, but that there is a large and rich field for the reception of many American goods, mainly in the lines of modern inventions, that are not at all known to the people of these regions."

Of the immense field for the manufacturers of cotton goods he says: "In China there are supposed to be 400,000,000 people. All of these clothe themselves principally with cotton. Allowing 20 yards to each person, 8,000,000,000

225, were entirely swept away. The buildings were all wood, which accounts for the rapidity and completeness of the destruction.

The Springfield Republican says: The locomotive gas consumer, on trial for the last few months by the Southern road, is proving so successful that after a little further experiment it will probably be put on all the company's engines. The consumer destroys over one-half the gas which causes the smoke so disagreeable to passengers and saves 10 per cent. of the coal.

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SEE PAGE 9.

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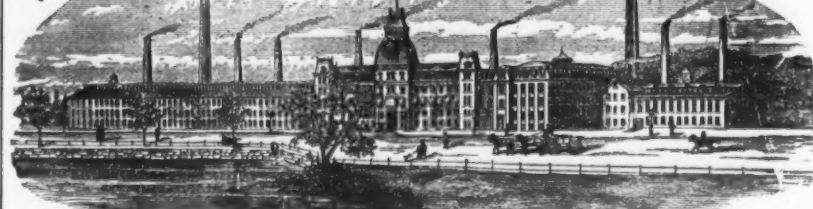
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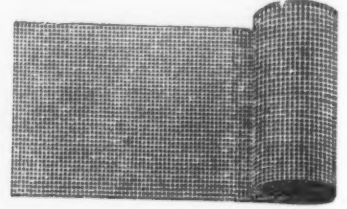
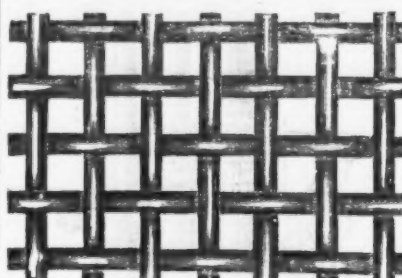
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in, and the vessel again turned up, when the flame dropped almost immediately. After being turned down for some fifty seconds it was (at Mr. Martin's suggestion) again blown for nearly a minute. Though it was clear that the metal was overblown, the action on adding spiegel was not violent. A large skull, however, was left in the converter and ladle, and much slag was produced. The blow lasted 10½ minutes. A rail made from one of the ingots de-
flected 9½ inches with the blow of a 1-ton ball falling 24 feet, the bearings being 3½ feet apart. It was considered much too soft for rails.

ANALYSES OF NO. 3 BLOW AND NO. 5 BLOW (DOWLAIS).*

	Blown	Steel	Blown	Steel
Pig. Metal	2.11	0.33	2.44	trace
S.	0.09	0.09	0.10	0.10
P.	1.27	0.61	1.43	0.64
C.	under	0.31	under	0.23
	0.10	0.35	0.10	0.23

The skull left in the converter was got out by blowing a charge of very silicious non-phosphoretic pig. In the next (fifth) blow, 1 cwt. of a mixture of two of lime-
stone and one of Elba ore was thrown cold into the converter before the metal was run in; rather over 3 cwt. of heated roll-scale was added subsequently, before the comple-
tion of the blow. During this blow the lining had to be patched at the breast.

In all cases where two analyses are given, the results to the right are those of Mr. Jenkins of Dowlaish. These results appear to confirm the con-
clusion that, for the process to be of techni-
cal value, waste of lining and metal must be avoided by making large basic additions, so as to secure a highly basic slag at an early stage of the blow. In these trials, however, it was thought prudent to feel the way, and not add at once the 3 or 10 per cent. of base which our theory demanded, the more so as we were not able to add the bases in a molten state. It would also appear that a slag containing under 14 per cent. of iron may be very effective in removing phosphorus. After the five blows described the lining was found to be much worn and not in a condition to admit of satisfactory repairs. Two tuyeres had to be renewed in the fourth blow; the rest stood well.

It is obvious that without a sufficiently durable, as well as refractory basic lining, the simultaneous dephosphorization and conversion of cheap pig in the Bessemer vessel cannot rank as a commercial process. Our early experiments rendered it clear that ordinary non-silicious lime and limestone did not constitute by themselves a satisfactory lining material, nor were renewed trials, made after becoming acquainted with a patent dealing with their application, more successful. Magnesia, the use of which as a furnace lining has been suggested by M. Caron and others, is at once very expensive, and when used by itself, very tender. After a very extended series of trials it was, how-
ever, found that by firing bricks made of an aluminous-silicious limestone at a very intense white heat, a hard and compact basic brick is formed. These bricks unfortunately labor under the defect of a liability to disintegration when exposed to the action of steam. By the use of certain aluminous magnesian limestones and equivalent combinations, and an otherwise similar mode of manufacture, it is believed that this difficulty has been overcome. For bottoms, tuyeres and many other purposes magnesian limestone mixed with silicate of soda solution forms an ex-
cellent material. To enter fully into the important subject of the precise conditions necessary for obtaining a satisfactory basic lining would exceed our limits, and the con-
sideration of this as of many other inter-
esting points must be reserved. The question of how far the heat due to the oxidation of phosphorus may replace that due to the combustion of silicon, the possibility of using in the converter low silicon phosphoretic pig and the influence of silicon on the re-
moval of phosphorus, are some of the sub-
jects on which much remains to be said.

In advancing the proposition that the technical removal of phosphorus in the Bessemer converter is simply and entirely a question of cheaply producing a basic (generally calcareous) slag, and indicating the means by which this may be secured, we are not aware that we can shelter ourselves under any very distinct authority, though surmises as to the hypothetical advantages that might be expected were the Bessemer slag less silicious, have not been wanting. It is, however, only proper that we should remind the institute that Mr. Snelus stated at its March meeting that he had removed phosphorus in a Bessemer converter lined with limestone. Of the circumstances of this experiment we are in ignorance. It is on the production of a basic slag, by the addition of bases, and without excessive waste of lining and metal, and the construction of a durable basic lining, that we venture to think, the economic solution of the phosphorus problem depends.

It need hardly be said that the theory here advanced as to the practicability of commercially removing phosphorus in the converter extends, *mutatis mutandis*, to the Siemens and other open-hearth processes, where, in fact, many difficulties that are met with in the converter are absent. Dr. Siemens has indeed suggested the use of a lime lining in one of his furnaces. The present paper will have fulfilled its purpose if it induces metallurgists to reconsider the verdict, so fatal to the hopes of steel-makers, that "oxygen, whether in its free state or as oxide of iron, is almost entirely inert as regards phosphorus at the intense tempera-
ture which accompanies the Bessemer process."

Causes of Boiler Explosions.—The chief engineer of the Manchester Steam Users' Association reports that ten ex-
plosions, killing eight persons and injur-
ing 14 others, have occurred during the interval between the 25th of May and the 20th of September inclusive. The result of the examination made by the officers of the association confirms, he says, with monotonous consistency, the conclusions pre-
viously arrived at, viz., that explosions are not accidental; that they arise from no mysterious causes or from the development of

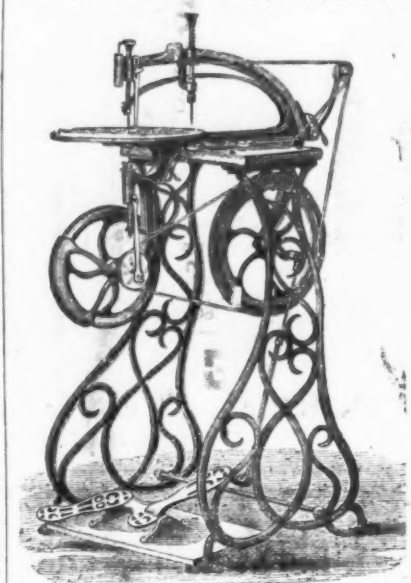
* The "blown metal" sample of No. 3 was taken before the last minute's overblow.

previously unknown forces, but that, destruc-
tive and violent as are the results, they are due in the majority of cases to the use of weak boilers, the boilers in some cases hav-
ing been weak to begin with, and in others weakened by wear and tear, the plates fre-
quently being found to be wasted away by corrosion till no thicker than an old six-
pence.

The "Boss" Scroll Saw.

The accompanying engraving represents a new scroll saw, manufactured by the Lewis Manufacturing Company, of Seneca Falls, N. Y. The makers claim for it several marked advantages over other similar ma-
chines. The first of these is the iron tilting table, with hollow ball and socket joint, through which the saw passes. This table can be changed or tilted to any desired position for sawing inlaid work. The face of the table is turned and polished, no veneered work being necessary to keep it true and firm. A patent saw clamp is used which will hold any width of saw, from the smallest up to three-eighths of an inch, or even wider if required.

The saw is driven by a double-grooved driving wheel, over which a ¾-inch round belt runs. The belt fits the groove, giving a



good bite so as to prevent the annoyance of slipping or lost motion. A boring or drilling attachment can be screwed to these machines in a few minutes, which is capable of boring a smooth, clean hole in wood or metal. It will carry drills up to one-eighth inch in diameter. In walnut it will bore at the rate of an inch in six seconds. The drill holder is intended for the Morse twist drills. The motion is steady, and there is no danger of splitting wood even in the most delicate pieces. A blower is attached to the machine by means of the thumb-screw, which secures the presser foot. It consists of a simple brass cylinder, with a plunger or piston fitting in it. This piston is secured to the upper spindle with a button, and gives a strong puff of air upon the work from an opening in the bottom of the cylinder at each downward stroke, which clears the work from sawdust. It is a very simple apparatus, but a very great convenience, as any one knows who has used a scroll saw. The stand is made especially for the machine, and is of such shape as to give a firm support and convenient table for the saw.

British Schools of Art.

The progress of elementary instruction in art in the British schools is indicated by a late report. The total number of persons taught drawing, painting and modeling through the agency of the art and science departments was, in 1875, 418,689; in 1876, 530,412; and last year, 610,620. The number of students taught in art classes was 29,579; and 549,010 children were taught drawing in elementary day schools, against 460,661 in 1876. During the period of 1873-77 the number of institutions in which instruction is given in drawing or in higher art, with the aid of the department and subject to its inspection, has nearly doubled. The number of persons taught and of exercises and works examined has more than doubled during the same period; while the total amount of the aid given by the department in the form of payments on the results of this instruction, as tested by examina-
tions, has risen from £31,918 in 1873 to £49,960 in 1877, or nearly 60 per cent. The lectures delivered in the Lecture Theater of the South Kensington Museum were attended by 8481 persons; the evening lectures to workmen at the Royal School of Mines by 1227 persons; and 172 science teachers attended the special course of lectures provided for their instruction in the new science schools at South Kensington. The various courses of lectures delivered in connection with the department in Dublin were attended by about 4300 persons. The total number of persons, therefore, who received direct instruction as students, or by means of lectures in connection with the science and art department, in 1877, is 681,367, showing an increase, as compared with the number in the previous year, of 81,199, or more than 13½ per cent. The attendance at the art and educational libraries at South Kensington continues to increase.

At the Paris Exhibition Mr. Edwards of Manchester, England, displays some driving belts worthy of mention. There is one double belt, 207 feet long, 63 inches wide, which weighs 2,962 pounds, and is made to transmit 600 indicated horse-power. Another is 184 feet long, 53 inches wide, while a third is 163 feet long and 63 inches wide. These two latter weigh together 4,375 pounds, are without cross joints from end to end, and are intended for a large cotton mill, to drive direct a fly-wheel 30 feet in diameter and 10 feet 3 inches on the face. The combined horse-power they are made to transmit is 1,000.

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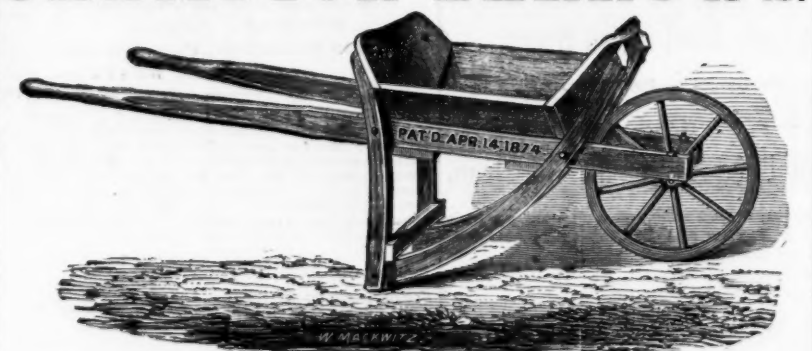
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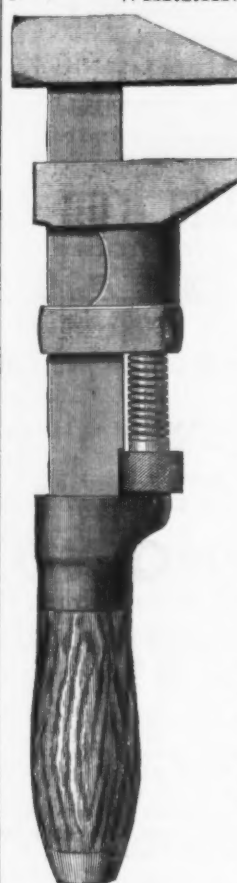
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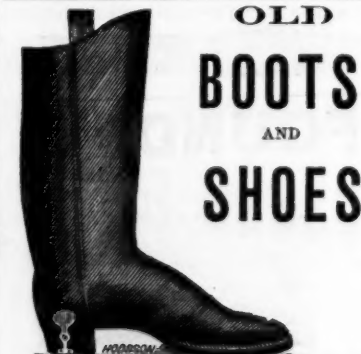
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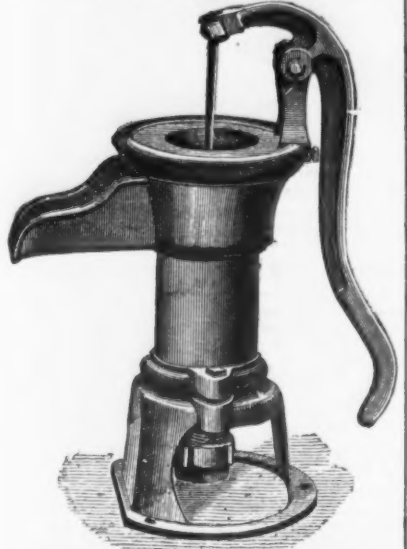
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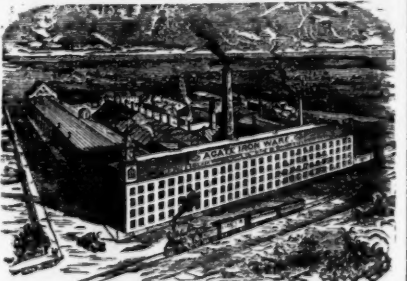
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The Mode of Combustion in the Blast
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It is a fact well known to metallurgists
that when working under the same condi-
tions a blast furnace charged with charcoal
can be made to produce a ton of pig iron
from any ore with less fuel than when coke
or anthracite is used. Prof. John A. Church,
of Columbus, gives the following review of
the explanations advanced to account for
that fact. There are two hypotheses which,
without pretending to claim absolute truth,
are looked upon by two different classes of
metallurgists as offering the best key to
the solution of the problem. One class, re-
presented chiefly by scientific men, of whom
Prof. Akerman of Sweden has been the most
recent advocate, considers the most
probable cause of the phenomenon to be the
quicker and more thorough reduction of car-
bonic acid, formed by the first impact of the
air upon the fuel in the near vicinity of the
tuyeres, and the high reduction power
thereby gained. Another class, chiefly the
practical men of the profession, think that
the high consumption of dense fuel has some
dependence upon their slower rate of com-
bustion, and that in order to oxidize a cer-
tain weight of fuel in a given time, more of
the dense fuel must be present to make up
for the slower combustion of each piece.
The first, the scientific explanation, is based
upon untrustworthy experiments. It is il-
logical because the reduction of carbonic
acid to oxide is a process absorbing heat,
so that if dense fuels allow the least of this
reduction in the crucible, the highest heat
ought to be secured there, and the crucible of
an anthracite furnace using the same amount
of fuel as a charcoal furnace would be hot-
ter. This is untrue, as comparisons be-
tween the Fletcher and the Elk Rapids fur-
naces, for instance, have shown. The second
explanation, based upon the assumption that
increased fuel consumption bears some rela-
tion to slow combustion is fallacious, because
slow combustion indicates the necessity not
of more fuel in proportion to ore, but a
greater surface of it, and therefore greater
nearths. If it were only necessary to ignite
a given amount of fuel in a given time, the
volume of blast needed would be equal in
both cases; but as anthracite furnaces re-
quire more wind than charcoal stacks there
must be some other reason for the increased
proportion of fuel to ore. Both explanations
do not conform with the following funda-
mental facts: that for a given weight of
fuel the well of a charcoal furnace is hotter
than that of a coke or anthracite stack, and
that more fuel reaches the lower part of an
anthracite furnace than of a coke or char-
coal stack.

Prof. Church offers a new explanation
which regards the problem from quite a
different point of view, and suggests conclu-
sions which, if verified, would greatly affect
present blast furnace practice and location.
It depends upon the different igniting pow-
ers of the three solid fuels—anthracite, coke
and charcoal—and draws the attention
away from the fuel in order to fix it upon
the behavior of the air. He claims that the
carbon duty of a fuel is proportional to its
power of combustion in extremely dilute
oxygen. It is well known that the power of
the air to sustain combustion decreases rap-
idly when it is mixed with carbonic acid,
the action of which is probably one of dilu-
tion merely. The limit when different kinds
cease to absorb atmospheric oxygen from
mixtures of nitrogen, carbonic acid and
oxygen, varies with their nature, and it is
owing to its power of burning in a weakly
oxidizing atmosphere that charcoal owes its
superiority over other fuels. To the same
cause is due the circumstance that the cruci-
ble of a furnace charged with a given weight
of charcoal is hotter than one heated with
the same weight of any other form of carbon.
Its porous structure offers the greatest sur-
face for oxidation, while its great bulk re-
duces the amount of mine and accordingly
of work to be done, in a zone of fusion of
given capacity. As it is favorable to the
action of the blast furnace that as much of
the oxygen is absorbed below the zone of fu-
sion—which must be considered a good
deal higher above the tuyeres than is
still generally assumed—time is a great ele-
ment in the problem, and that fuel is best
which allows the oxygen the shortest path
before it is completely absorbed.

In the anthracite furnace the fuel com-
bines readily enough with the blast so long
as it is rich in oxygen, but when a certain
limit is reached combustion becomes slow
and a considerable portion of oxygen es-
capes upward. In order to obtain the re-
quisite temperature a larger amount of air
must be blown in, by which, it is true, the de-
sired temperature of the crucible is attained,
but at the same time a considerable amount
of oxygen is fed into the furnace, which
escapes upward and requires an additional
amount of fuel. It is probable that the
greater heat imparted to the materials by
this surplus of fuel is more than counter-
balanced by an increased amount of car-
bonic acid reduced.

Prof. Church has sought confirmation of
his views in the nature of the improvements
by which the capacity of anthracite fur-
naces has so greatly been increased of late.
The means by which that end was success-
fully attained were: An increase of height
and capacity of stack, an increase of the
temperature of the blast, and an increase of
the capacity of the hearth. The first two
of these improvements raise the tempera-
ture of the two elements of combustion, and
thus assist their combination; the third less-
ens the velocity of the blast in the hearth,
and thus increase the time of contact. A
consideration of the facts as they exist in
the working of a furnace tends to confirm
his opinion, as it shows that the reasons why
bad working is produced by infusibility of
slag and by the use of dense fuel, are simi-
lar. As the gangue is difficult to melt, the
hot gas from the hearth will not be able to
produce fusion over so wide an area, part
of its heat going to melt the gangue, while
otherwise it would be free from that duty
and have nothing but iron sponge to fuse.
The infusible fuel forms a column in the
well, the height of which acts favorably be-
cause it increases the contact of the same
with the blast. Any causes which call for
a consumption of freshly formed carbonic
oxide, as, for instance, infusibility of slag,

lessens that column, the height of which
depends besides upon the amount of oxygen
burned in the well in a given time and the
proportion of mine to the carbon in the fuel.
The same effect is therefore produced by
dense fuel also. Less oxygen is consumed
for a given height of fuel, less heat produced
and the area over which fusion can be main-
tained is reduced.

With the object of inviting criticism Prof.
Church has indicated some points which may
be deduced from the foregoing generaliza-
tions. Although charcoal is acknowledged
to be the best fuel for blast furnaces and an-
thracite the worst, ironmasters have insisted
in making the fuel which occupies an inter-
mediate position between the two as nearly as
possible similar in its qualities to the inferior
material. The reason why all endeavors
have been made to produce as hard, strong
and ringing a coke as possible, is the notion
universally held, though not sustained by
facts, that fuel-like charcoal or lightly
burned coke would be crushed in the fur-
nace and be unable to bear the weight of the
burden. The fact that solid blocks of char-
coal are known to fill the crucible and have
always been taken from the fore-hearth when
furnaces with open hearths were in vogue,
would seem to disprove this idea. From the
argument of Prof. Church, however, it fol-
lows that, on the contrary, the lighter and
more porous the coke is the more
it will approach in quality the high
value of charcoal. If this were true
less caking coals would possess an ad-
vantage over the more strongly bituminous,
both in the quality of the material produced
and in the yield. Such a change in the
sentiment upon coke burning would greatly
affect both the coal and iron industries of
sections of the country whose soft coke has
been hitherto pronounced to be unfit for
metallurgical purposes. Prof. Church meets
the objection which will immediately sug-
gest itself to ironmasters, that it is a fact
that the best results are obtained by the use
of hard Connellsville coke, by pointing to
the circumstance that most of the fuels from
which lighter coals have been made are
slaty and that they have not been suffi-
ciently well prepared before coking. Their
high percentage of ash has therefore really
been the cause of an inferiority which has
been hitherto pronounced to be the result of
their texture.

A second point which is deduced from
the theoretical considerations cited regards
the form of the blast furnace. Steep boshes
cause great variations of the area of the
zone of fusion as soon as slight changes of
the height of the fuel column take place. The
less the boshes are inclined from the verti-
cal the more regular will be the working of
the furnace, a conclusion which harmonizes
well with the experience of Mr. John T.
Bennett of Pittsburgh, at the Soho Fur-
nace, with whose alteration in the dimen-
sions of the hearth, as laid down in the
Metallurgical Review, Prof. Church seems
to agree.

**Large Machinery for Bagging Austra-
lian Crops.**—The Australian government
has offered a large reward for the produc-
tion of a machine for securing some of the
common crops of that country. In regard
to this the London *Ironmonger* says: The
South Australian government is now pre-
pared to pay a reward or bonus of £4000 to
the inventor of the best machine combining
within itself the various operations at the
same time of reaping and cleaning, fit for
bagging on the field, the various cereal
crops of South Australia. The machines
submitted are to be competitively tried in
December, 1879, and will be tested specially
as regards their strength, durability, light-
ness of draught, cost, work done, results of
cleaning, and simplicity. The conditions
by which this apparently generous offer
are hedged about, however, are such as will
in all probability effectually prevent our
best makers from competing. It is not cer-
tain, we infer from paragraph No. 5 of the
official proclamation, that the whole reward
will be paid. No bonus will be given un-
less the machine is a decided improvement
upon any in use in the province, and the
successful competitor will only be allowed
to patent his machine provided he declines
to receive the bonus. In other words, man-
ufacturers are to invent new machines, pay
their carriage over half the globe, run the
risk of failure and the many uncertainties
of such trials, and expose themselves to the
danger of piracy on all sides, and yet have
no protection. It is, therefore, we assume,
not unlikely that the best British houses will
be conspicuous by their absence.

What makes a Car Load.—This ques-
tion is thus answered by the *Butter, Cheese
and Egg Reporter*: Nominally, an American
car load is 20,000 pounds. It is also 70
barrels of salt, 70 of lime, 90 of flour, 70
of whisky, 200 sacks of flour, 6 cords of soft
wood, 15 or 20 head of cattle, 50 or 60 head
of hogs, 80 to 100 head of sheep, 6000 feet
of solid boards, 340 bushels of wheat, 400 of
corn, 680 of oats, 400 of barley, 360 of flax
seed, 360 of apples, 430 of Irish potatoes,
300 of sweet potatoes, 1000 bushels of bran,
130 to 190 barrels of eggs and 15,000 to 26,
000 pounds of butter.

The Wilmington (Del.) *Evening*, in a four-
column report of the condition of the indus-
tries in that city, states that out of a popu-
lation of 40,000 there probably never has been
a time when there was not at least 5 per
cent. of the adult male population of the
city idle, and at present the number who
are known to be out of work, and can be
counted up, is over 500; about two-thirds
are laborers and the remainder mechanics,
with a sprinkling of clerks, salesmen and
bookkeepers, which it is thought is a very
favorable showing of the condition of busi-
ness.

Taking as a text the unfortunate history
of English and German iron clads, which
have been either unseaworthy or so unwieldy
that they have run one another down when
under motion, the *Glasgow Herald* comes
to the conclusion that the maritime world
is approaching an era in which navies for
fighting purposes will be abolished, and an
international ocean police substituted.



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NEW

AMERICAN FILE COMPANY.

THE NEW AMERICAN FILE COMPANY have the exclusive right to use the Bernot process for cutting Files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing Files and Steel.

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Superior Hand-Cut
FILES AND RASPS,
MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.
FULLER BROS., Sole Agents,
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Granted for



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Pennsylvania File Works,
Fourth St., north of Columbia Ave., Philadelphia, Pa., U. S.

Superior Goods.

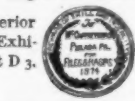


Silver Medal.

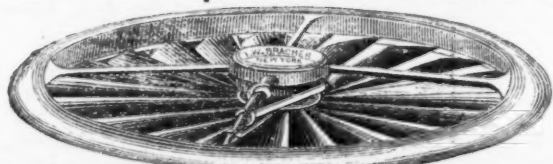


Domestic and foreign buyers who are desirous of handling a superior File or Rasp should send us their orders. Gentlemen visiting the Exhibition Universelle in Paris are invited to examine our exhibit at D 3, American Section.

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For everything (and every size), from a hat or cap to an exhibition building. Kitchens, Laundries, &c., ventilated without draft. Durable, strong, without rivets or solder. Oiled for six months. Each one has storm cap. Retail price, size six inch diameter, \$1.00 and upwards; apparatus with which any one can cut circles in glass, 15 cents each.

Protective Ventilators avoid drafts, exclude dust, dampness, malaria and germs of disease; adopted by hospitals, schools, institutions, &c.; applied to any window or room. Prof. A. L. Loomis, M. D., University of City of New York, writes as follows: "From my personal experience and that of my patients who have used your Ventilator during the past six months, I am convinced that your method of removing dust, impurities and dampness from the atmosphere is the best which has as yet been proposed. By it the air in an apartment can be constantly changed without causing drafts. I would especially recommend its adoption in sick rooms, sleeping apartments, nurseries and school rooms."

Air Filters and Moisteners, placed over hot-air registers of furnaces, &c., prevent dust and supply steam filtered air. Prices and discounts to the trade sent on application.

The "Economy" Molding Weather Strip is perfect in every respect. By enlarging edge of rubber or felt, and making slot in molding to correspond (see engraving), we save all after expense of molding. Once purchased it will last a lifetime, because rubber, etc., has only to be removed by taking old piece out of either end of molding, and sliding in a new piece. By this method of securing rubber all uncertainty of fastening or undoing of glue or tacks is overcome.

Rubber supplied with enlarged edge and instructions to enable Car Manufacturers, Carpenters, Builders and far off trade to make slots in Sashes, Doors, Mouldings, &c., and thus make perfect Weather Strips.

No. 6.



BRACHER VENTILATOR CO., No. 3 Park Row, New York.



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MOUSE TRAPS,

For Home and Export Trade.

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RIPLEY MFG. CO.

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Manufacturers of

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CARROLL L. RIKER, JOBBER OF SPECIALTIES, offers the following regular specialties to the trade in the quantities and at the prices quoted: Coe's Pattern Malleable Wrench, 10 in., 2 1/2 lb. ea.; 12 in., 3 lb. ea.; Giant Nail Puller, 8 in. ea.; and Little Giant ditto, 8 in. ea.; Dover Egg Beater family or tumbler size, 3 lb. ea.; Mrs. Potts' Pat. Crown Irons, 5 pieces, \$1.25 per set; the Crown Fluter, 4 in. rolls, \$2.10 ea.; Clawed Tack Hammer, 6 in. ea.; the Lawrence Perfect Curry Comb, 4 bars, close back, 50 ea.; 5 bars, open back, 80 ea.; Homer & Co.'s Padlocks, No. 25, 3 in. h. 1 lb. ea.; Mouse Traps, 150 per doz. holes; Heavy Adze Eye Malleable Hammer, full polish, 120 ea.; Marvin's Saws, 50 off the list price; Marvin's Scales, 40 off the list price; Fairbanks Scales, 30 off the list price; Seven Chamber Revolver, warranted steel barrel and chamber, nickel-plated, 22 bore, with cleaner and box, \$1.20; Swift's Coffee Mills, discount 25 off list; Screws by the single gross, 5 off Russell & Erwin's list; Sand Paper, B. A. & Co.'s, fine, medium and coarse, 10 per sheet; Cryst. Spring Toilet Soap, in half gross boxes, \$1.60 ea.; Solid Leather Back Horse Brushes, 300 ea.; Blacking Brushes, \$1.00 per dozen; the same, extra fine, 300 ea. Terms, net cash before shipment; packing, 25c; cartage, 25c. Send postage for my illustrated catalogue containing cuts of several hundred different specialties. 75 Chambers and 75 Church Sts., New York.

MACHINE MOULDED MILL GEARING,

AS ACCURATE AS CUT GEARING

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Saves Time and Expensive Patterns.

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LEFFEL TURBINE WATER WHEELS,

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94 Chambers St., N. Y., Agents for American Screw Co.'s Wood, Machine and Rail Screws, Stove and Tire Bolts, Rivets, &c. O. Ames & Sons, Shovels, Spades and Scoops. A. Field & Son, Tacks, Brads, Nails, &c. G. F. Warner & Co., Carriage Clamps. We have also on hand a general assortment of Hardware

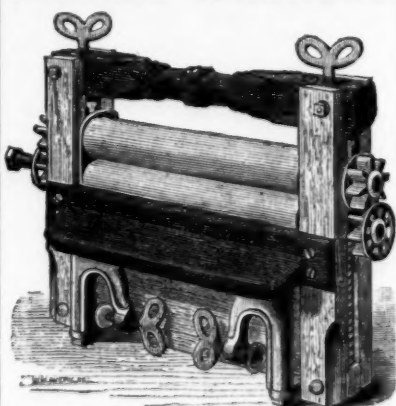


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No.	Size of Rolls.	Price per doz.
10	10X1 1/2	\$60.00
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18	11X1 1/2	71.00

Wood Frame Friction Wringers.

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1 1/2	10X1 1/2	\$51.00
1	10X1 1/2	54.00
3	11X1 1/2	62.00

Self-Adjusting Iron Frame Friction Wringers.

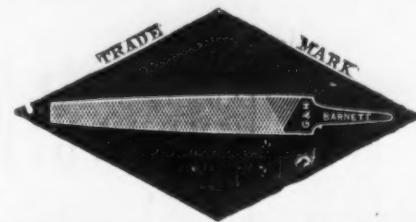
No.	Size of Rolls.	Price per doz.
2 1/2	10X1 1/2	51.00
2	10X1 1/2	54.00
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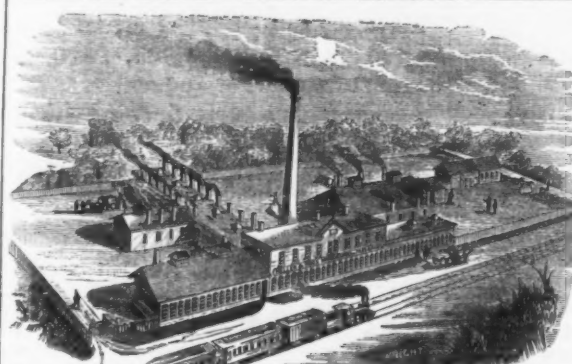
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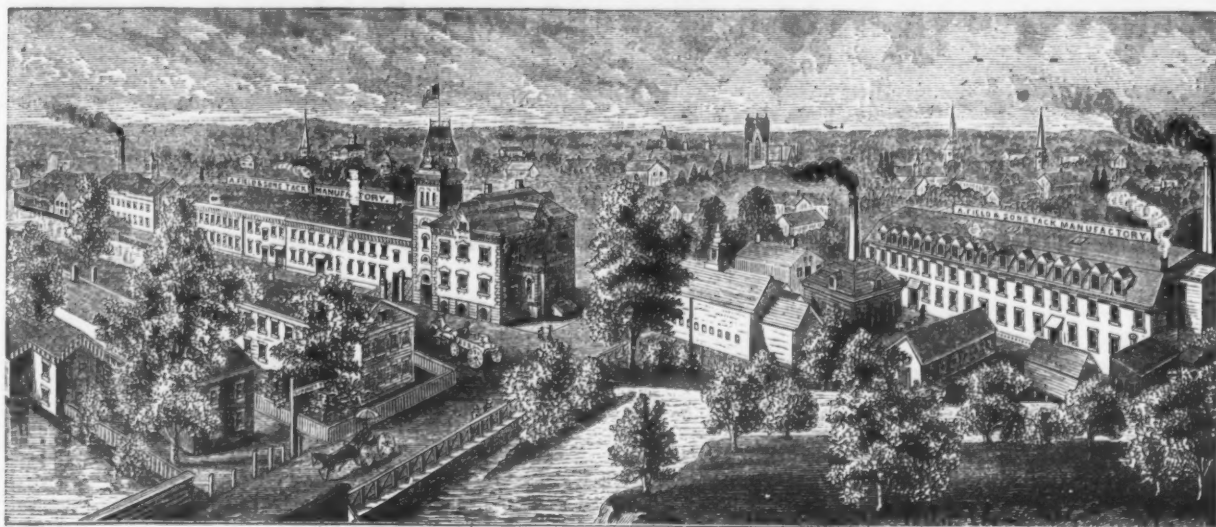
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FINE TEMPERED STEEL SPRINGS.
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ANSONIA CORRUGATED STOVE PLATFORM

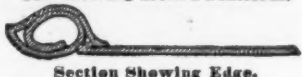
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Cut Showing Round Platform.



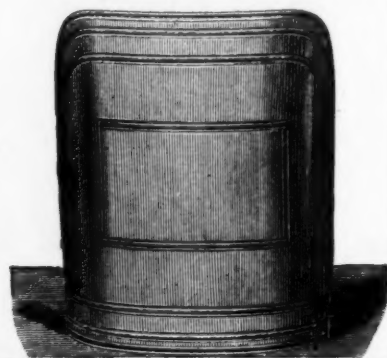
Section Showing Edge.

ANSONIA Bronzed Fire Screen,

With Ornamented Mouldings.

PATENT APPLIED FOR.

The Portable Bronzed Fire Screen or
Shield, as shown in the illustration, is especially
designed for the safety and protection of walls, fur-
niture, woodwork, paper or varnish from heat.
Being constructed of metal, with firm and substan-
tial edges, curved in form to stand alone, it may be
easily adjusted to any position about a stove, before
a grate or fire place. The demand for something
useful, durable and ornamental as a Fire Screen has
long been felt, and having finally accomplished the
desired end, we are prepared to fill all orders
promptly.



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MANUFACTURERS OF

MACHINERY & TOOLS.

Gears Cut and Index Plates Made and
Drilled to Order.



PATENT CUTTERS FOR THE TEETH OF GEAR WHEELS

can be sharpened by grinding without changing their
form. Cutters made on this plan will outlast many of
the old form, with the advantage of being always ready

for use. If the cutter becomes dull before a wheel is completed, it can be taken out, sharpened and
returned to its place in a few moments without risk of altering the form of teeth to be cut. Cutters
for milling any irregular form made to order on the same plan. Parties having occasion to use mills
for irregular shapes on sewing-machine, gun or other work, will readily see the advantage such cutters
possess over those in general use, both as regards economy and convenience. Descriptive circular
with price list sent by mail on application.



Patented
January 4, 1876.

Patented
June 13, 1876.

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RHODE ISLAND HORSE SHOE CO.,

OFFICE, 81 Canal Street, Providence, R. I. WORKS at Valley Falls, R. I.

Manufacturers of

PERKINS and RHODE ISLAND PATTERNS OF

HORSE AND MULE SHOES.

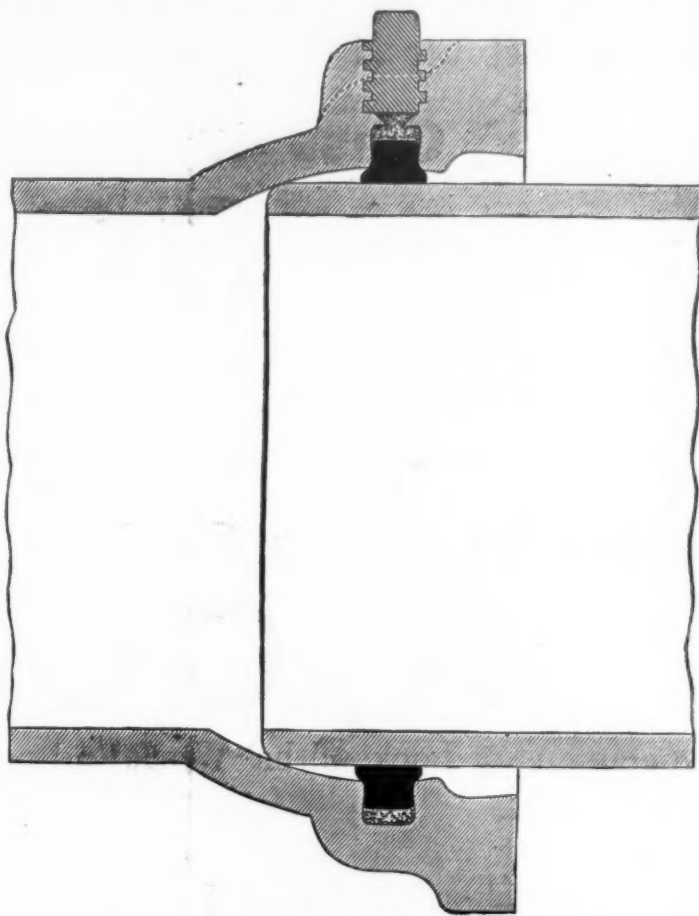
Hydrostatic Joint for Cast-Iron Pipe.

The accompanying illustration represents
a new form of lead joint for cast-iron pipes,
invented and manufactured by Wm. Painter,
44 Holliday street, Baltimore, Md. One of
the first points of novelty is that the joint is
calked by hydraulic pressure instead of by
a calking iron in the usual way. The form
of pipe used differs somewhat from the
standard pattern, as will be seen from the
cut. The bell has its inner surface concave,
so as to form a sort of socket, as in a ball-
and-socket joint, while the spigot end is
plain, the bead being omitted. In the bell a
dove-tailed groove is cast for holding the
lead packing by which the joint is to be
made tight. Before the pipes leave the
manufactory a lead ring is cast in the bell
in such a manner as to nearly fill the groove
in the bell, shown in solid black in the cut, and
to project inward almost far enough to touch
the spigot end when inserted in place.
There is just enough clearance to permit the
easy entrance of the spigot. The socket of
the bell of course centers the ends of the
pipes, even if two lengths are not in line.
The pipes are furnished already for laying,
and there is no melting of lead or pouring in
the trenches, with the accompanying an-
noyances, delays and expense.

When the spigot is placed in the hub the
calking is effected by forcing a thick fluid
material behind the lead and driving the
lead out into contact with the spigot. This
is accomplished by means of a small hy-
draulic jack, which is screwed into one
side of the bell. The cut shows the hole
stopped by a screw plug after the jack has

The joint can be formed when water is
present in the trenches, and with great fa-
cility even in places difficult of access.
There being no bead on the spigot, the sec-
tions may be disconnected by wrenching or
working the parts in such a way as to
spread and slightly enlarge the internal
diameter of the lead gasket. Plugs or caps
may be removed by striking them in such a
manner as to produce a like result. The
joints are re-formed or new connections
made with the same bells by simply renew-
ing the hydrostatic pressure, as in the first
instance. In case of repair from unusual
cause it is only necessary to make a small
opening in the street, reaching to the top of
the bell, attach the forcing jack, renew the
hydrostatic pressure upon the gasket and
restore the screw plug. Lastly, it is claimed
that as a last resort the ordinary calked
joint can be used, ample space existing be-
tween the spigot and the bell for this pur-
pose. While this advantage is simply an
incidental one, it is considered by some en-
gineers important in any joint offered as a
substitute for the old one. Aside from the
great reduction in labor, the obstructions of
streets, both in making the joint and neces-
sary repairs, is materially lessened by the
rapidity with which these joints may be
made. The hydrostatic joint has been tested
under a water pressure of 1000 pounds per
inch without leakage, and has withstood a
deflection of 9 inches in 12 feet without
being impaired.

The total interest bearing debt of the
United States, July 1, 1865, was \$2,221,311,-
918. On the first of July, 1878, it was \$1,-



A NEW HYDROSTATIC JOINT.

been removed. The groove in which the
lead is held being wedge-shaped, the pres-
sure of course brings it tightly into place as
it is forced outward, preventing the escape
of the fluid behind it.

The enormous hydrostatic pressure thus
brought upon the lead gasket thoroughly
imbeds it in the surface of the iron, at the
same time causing it to spread laterally,
fixing it immovably in the groove and ef-
fectually preventing it from being forced
back. The actual surface of the gasket in
contact is about five-eighths inch wide—
considerably more than in the calked joint.
The jack is then removed, the threaded
opening filled with moist clay and a screw
plug inserted, completing the joint. The
whole operation in a large main requires
less than three minutes. The material used
for forcing the lead out is a saponaceous
compound of lye and resin thickened with
whiting. It is said that in case of deflection
of the joint after the pipes have been laid,
the spigot is drawn away from the bell so
that there is no prying action as in the ordinary
joint.

It is evident that the perfection of the
joint does not depend upon the employment
of skilled labor in laying the pipe. It is only
necessary, in using the jack, to carry the
pressure up to the proper point indicated by
the gauge and the work is done, since the
liquid distributes the pressure within the
groove and carries it to all parts of the lead
gasket for packing equally.

The advantages claimed are that this
joint requires less than one-third of the lead
and one-tenth of the labor of a calked joint,
and in gas pipes a great saving because
of the uniform tightness of the joints.
All hemp and similar gaskets are dispensed
with. There is, of course, no enlargement
required of the trenches at the joints and
less back-filling and repairing is needed.
The narrow bearing of the spigot upon the
lead, with the concave surface of the bell,
it is claimed will act as a ball and
socket joint, and will allow a considerable
deviation from the original line of the pipe
without in the least affecting its tightness.
It is manifest that the lead packing cannot
be blown out, even where a very heavy
pressure comes suddenly on the pipes, as is
sometimes the case in the Holley Water
Works. As we have said, the lead packing
gasket is (preferably) cast in place at the
foundry, and all the usual cumbersome melt-
ing appliances dispensed with in laying the
mains, the only tool there employed being the
jack for injecting the forcing material. In
forming the joint the jack contains suffi-
cient material to make a number of joints.

794,735,650, a decrease of \$426,576,278. In
spite of this reduction it is probable that
the amount of United States bonds held in
this country to day is larger than it was
13 years ago. In refunding the debt, large
amounts have been sent here from abroad,
while the new bonds have not been taken
in their place. In the English and Conti-
nental markets hundreds of millions of dol-
lars have been loaned during this period to
bankrupt nations. English capitalists have
suffered terribly by losses of this kind, and
are coming to the conclusion that it is better
to hold the securities of an honest nation at
a low interest rate than those of nations
which promise to pay higher rates but
finally default on both principal and interest.

The Fall River, Mass., correspondent of
the Providence Journal remarks: Although
manufacturers still favor the short-time
policy and believe that ultimately it will be
made to pay, there is a growing feeling in
other business circles against it. The mills
are substantially owned by our storekeepers
and professional men. The loss which the
short time has caused to them in their private
business they feel far outbalances any
possible gain to their mill stock. They were
willing to try the experiment temporarily,
but are not at all satisfied with the results.
They point at the fact that storekeepers are
unable to pay their rents, which have to be
reduced; so also to the tenement houses
occupied by operatives, and they maintain
that persistence in the policy will cause a yet
more serious shrinkage in the value of real
estate.

When the potato bug invaded Prussia last
year the authorities of Schildau and Mulheim
built fences around the fields, covered
them with sawdust and tan bark, soaked this
with petroleum and set fire to the mass. The
heroic and expensive treatment has been
completely successful, as not one of these
insects has been seen this year. Thus have
the discovery and uses of American petro-
leum prevented the spread of a scourge
which might have caused a demand for
American potatoes.

Some of the Holyoke manufacturers have
adopted the system of weekly payments,
instead of monthly, paying on Thursdays
for the week ending on the preceding Sat-
urday. One great advantage of this system
over the older one is that it tends to break
the custom among the laboring classes
of buying on credit, a custom alike injurious
to buyers and sellers.

RUSSELL & ERWIN MANUFACTURING COMPANY

Manufacturers of HARDWARE.

FACTORIES, - - - NEW BRITAIN, CONNECTICUT, U. S. A.

MANUFACTURERS' AGENTS AND DEALERS IN GENERAL HARDWARE AT OUR

WAREHOUSES: NEW YORK, 45 & 47 Chambers Street; PHILADELPHIA, 425 Market Street; BALTIMORE, MD., WM. H. COLE, Agent, 17 South Charles Street.

At the distribution of Prizes at the

Exposition Universelle, Paris,

on Monday, October 21, 1878, the following AWARDS were made to us:

Group V, Class 43.

A GOLD MEDAL

For an extensive assortment of all the various qualities and styles of Builders', Cabinet and General Hardware and Tools, including a great variety of Door Locks, Padlocks, Handles, Bolts, Hinges, Fire Irons, Pulleys, Sheaves, Chisels, Screw Drivers, Wrenches and General Tools for joiners' use.

Group VI, Class 66.

A GOLD MEDAL

For specimens of Locksmiths' Work and perfected Builders' Hardware, including a great variety of Door, Cabinet and Pad Locks.

Group II, Class 11.

A BRONZE MEDAL

For a collection of Designs for the decoration of Door, Window and Fire-Place Furniture.

Group III, Class 25.

A BRONZE MEDAL

For Artistic Fittings in Statuary Bronze, Nickel, Gold and Enamel for Door, Window and Fire-Place Decoration.

Group VI, Class 59.

AN HONORABLE MENTION

For a collection of Wood-Working Tools and Apparatus, including a large assortment of Augers, Bits, Chisels, Gouges, Bit Stocks, Hollow Augers, Screw Drivers, etc.

Making a grand total of

**Two Gold Medals,
Two Bronze Medals, and
An Honorable Mention,**

being the GREATEST NUMBER OF AWARDS RECEIVED BY ANY ONE EXHIBITOR.

Cutlery.

FRIEDMANN & LAUTERJUNG,

Manufacturers of PEN AND POCKET CUTLERY.

Solid Steel Scissors, Shears, Razors,
Russia Leather Straps, Hones, &c.

Sole proprietors of the renowned full concave patent

"ELECTRIC RAZORS,"

And the celebrated "ELECTRIC SHEARS." Nickel Plated
Hones.

Agents for the BENGALL RAZORS.

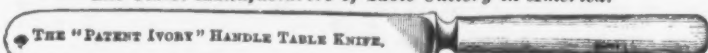
AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.

1 Chambers and 73 Heade Sts., N. Y.

423 N. Fifth St., ST. LOUIS, MO.

MERIDEN CUTLERY CO.

The Oldest Manufacturers of Table Cutlery in America.



EXCLUSIVE MAKERS OF THE

CELLULOID

HANDLE FOR TABLE CUTLERY. A most beautiful and perfect substitute for Ivory. Also makers
of all kinds of TABLE, BUTCHER AND HUNTING KNIVES.
Illustrated catalogues with prices sent to the trade on application. 49 Chambers St., New York.

ESTABLISHED 1853.



AARON BURKINSHAW,

Manufacturer of Pen and Pocket Cutlery, Pepperell, Mass.
My Blades are forged by hand from the best Cast Steel, and warrant-
ed. To me was awarded the Gold Medal of the Conn. State Agricultural Society.

HALL, ELTON & CO.,

Electro Plated Ware, German Silver and Britannia Spoons.



Factories, Wallingford, Conn.

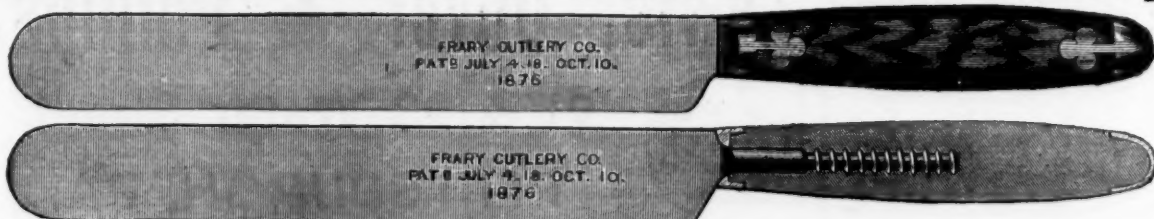
Salesroom, 75 Chambers Street, New York.

THE FRARY CUTLERY COMPANY,

FACTORY, BRIDGEPORT, CONN.

NEW YORK OFFICE & WAREHOUSE, with WIEBUSCH & HILGER HARDWARE CO., 84 Chambers St.

Manufacturers of all kinds of Table Cutlery.



The above illustrations represent their New Patent Screw Tang Lock Fast Solid Handle Knife.

There is no question but that a solid handle Knife is much more preferable than a scale tang. The great objection to their use hitherto is, that no solid wood handle
has been placed on the market with the handle properly secured—no handle put on with cement will stand the wear and tear of every day usage. The cement will expand
and contract with the action of heat and cold, and become loose, crack and come off, causing great prejudice against their use. This objection is overcome in our patent
screw tang. A wood screw is welded to the tang of the Knife or Fork, and screwed firmly and securely in the handle and locked there by the bolster, making a very strong
seat and handsome knife. When we warrant never to get loose, crack or come off. We manufacture a large variety of patterns, both Table, Butcher and Carvers, and
furnish the patent handle nearly as low as the scale tang. We are prepared to furnish this line of goods, together with the scale tang and iron handle, very promptly,
and very respectfully invite the attention of the trade.HOLROYD & CO.,
Waterford, N. Y.

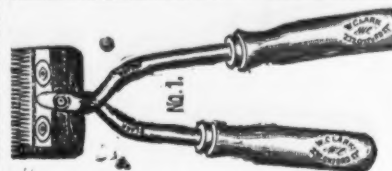
CLARK'S PATENT EXPANSIVE BITS

Made of JESSOP'S BEST CAST STEEL, and warranted superior to any other
Two sizes: Large Size Boring, 1/4 to 3 inches; Small Size Boring, 1/8 to 1 1/4 inches.

WILLIAM A. CLARK,

Westville, Conn.

Cutlery.



McCoy & Co.,

134 & 136 Duane Street, New York.

SOLE WHOLESALE AGENTS

CLARK'S

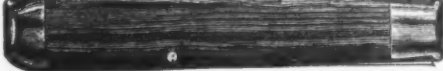
PATENT HORSE CLIPPER

Five styles. Fully described by our circular and
price list, which we will send on application.
The genuine are stamped on both the wooden
and metal parts, as shown in the illustration, as a
protection against inferior imitations.
All repairs executed with care and dispatch.

HERMANN BOKER & CO.,

101 & 103 Duane Street, New York,

SOLE AGENTS FOR THE

GARDNER PATENT
POCKET KNIVES

All of Gardner's Patent Knives are fully warranted.

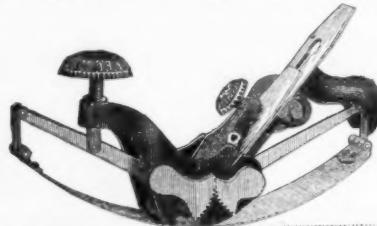
NAUGATUCK CUTLERY CO.,

Manufacturers of FINE PEN & POCKET CUTLERY.

FULLER BROS., Sole Agents, 89 Chambers and 71 Heade Sts., N. Y.

STANLEY RULE AND LEVEL CO.,

MANUFACTURERS OF

Improved
Carpenters'
Tools.

New Britain, Conn.

WAREHOUSES,

29 Chambers St.,
New York.

No. 113, Improved Adjustable Circular Plane - \$4.00

Cutlery.

JOSEPH S. FISHER,

No. 411 Commerce St., PHILADELPHIA

AGENT FOR

George Wostenholm & Son,

"Limited."

Washington Works, SHEFFIELD,

Celebrated I-XL Cutlery, Razors, &c

AGENT FOR

WALTER SPENCER & CO.,

Steel and File Manufacturers,

Rotherham, ENGLAND.

Corporate Mark

NO SPENCER
ROTHERHAM

Granted 1777.

Wire Rope as a Substitute for Chain
Cable.Two of our largest manufacturers of wire
rope offer to rig a ship free of expense, in-
cluding Manton's patent windlass, for the
purpose of demonstrating the superiority of
wire rope as compared with chain cable.
The offer is made by Roebling's Sons and by
J. Lloyd Haigh. The latter a few days ago
completed his contract for the delivery of
7,000,000 pounds of wire for the rope of the
Brooklyn Bridge, at a cost of \$600,000.The introduction of wire rope for ships'
cables is much discussed at the present mo-
ment both in England and the United
States. In 1812 the clumsy hemp hawser
was displaced by the chain cable, and it is
claimed that the revolution thus brought
about within the last 60 years in the equip-
ment of ships is greater than would result
from the adoption of wire rope. The merits
of the latter, however, remain to be tested
in practical navigation.The breaking strain of a 2 1/2-inch chain is
said to be 248,444 pounds; that of a 2 1/4
inch wire rope (claimed to be the equivalent
of the former), 353,100 pounds. In weight,
per fathom, the comparison is: chain, 425
pounds; wire rope, 51.48 pounds. Thus, as
regards strain, there is some difference in
favor of wire rope, while in weight the
superiority is marked. The point respect-
ing which there may be some question is
the ability of wire rope to endure a
jerking strain, but evidence in its favor
can hardly be lacking after the many
tests afforded in steam elevators, where
the use of this material is universal. As to
the handling, Manton's wire rope
windlass, patented May 21, 1878, and
which is of late the subject of much in-
quiry among navigators, is said to overcome
every difficulty. In cost, considering the
greater weight of chain, the difference is
claimed to be inconsiderable. Comparing the
relative merits of wire rope and chain, the
argument is well summed up by Mr. G. S.
Abegg, in a paper read before the Institute
of Naval Architects in London. He says
that where an ordinary anchor for a 1000-ton
ship weighs 1 1/2 tons, the proportionate
chain cable of 90 fathoms weighs 7 tons and
is quite unmanageable; a wire rope fully
equal acting as a substitute would be little
more than 1 ton weight, easily handled.Joseph P. Manton's windlass consists first,
of a novel arrangement of a V-shaped pulley,
connected by suitable locking devices with
the driving shaft, so that the same is readily
disconnected therefrom and controlled by a
friction brake; second, an arrangement
of V-shaped guide pulleys operating in con-
nection with the main pulley, so as to in-
sure a larger amount of contact by guid-
ing the cable around the greater por-
tion of the periphery of the main pulley; third,
of a novel arrangement of an eccentric
clip or contact pulley, acting on the cable
and holding the same in close contact with the
main pulley to prevent slipping; fourth, of
an arrangement with the windlass of a drum
on which the cable is automatically wound
and at the same time hauled in.Invention of Gas Lighting.—The in-
ventor of gas lights is said to have been a
Frenchman, Phillippa le Bon, an engineer
of roads and bridges, who in 1772 adopted
the idea of using for the purpose of illumi-
nation the gases distilled during the com-
bustion of wood. He labored for a long
time in the attempt to perfect his crude in-
vention, and it was not till 1799 that he
confided his discovery to the institute. In
September, 1800, he took out a patent, and
in 1801 he published a memorial containing
the result of his researches. Le Bon com-
menced by distilling wood, in order to ob-
tain from it gas, oil, pitch and pyrogenous
acid; but his work indicated the possibility
of obtaining gas by distillation from fatty
or oily substances. From 1799 to 1802 Le
Bon made numerous experiments. He es-
tablished at Havre his first thermo-lamps;
but the gas which he obtained, being a mix-
ture of carburated hydrogen and oxide of
carbon but imperfectly freed from its im-
purities, gave only a feeble light and evolved
an insupportable odor, and the result was
that but little favor was shown to the new
discovery; the inventor eventually died,
ruined by his experiments. The English
soon put in practice the crude idea of Le
Bon. In 1804, one Winsor patented and
claimed the credit of inventing the process
of lighting by gas. In 1805 several shops in
Birmingham were illuminated by gas man-
ufactured by the process of Winsor and Mur-
dock. Among those who first used this new
light was James Watt. In 1816 the first
use of gas was made in London, and it was
not until 1818 that this invention, really of
French origin, was applied in France.The creditors of Kimberly, Carnes & Co.,
Bradley, Reis & Co., the Aetna Iron Works,
(Limited), and the Neshannock Iron Works,
at a meeting held in Pittsburgh on the 16th,
accepted a proposition for compromise. The
Aetna Iron Works proposed to pay 45 cents
on the dollar—5 cents in 6 months, 10 cents
in 12 months, 10 cents in 18 months, 10 cents
in 24 months and 10 cents in 30 months.
Kimberly, Carnes & Co. offered 40 cents on
the dollar—5 cents in 6 months, 5 cents in 12
months, 5 cents in 18 months, 5 cents in 24
months, 10 cents in 30 months and 10 cents
in 36 months. Bradley, Reis & Co. offered
35 cents on the dollar, payable in four equal
payments, in 6, 12, 18 and 24 months, and
the Neshannock Iron Company 25 cents on
the dollar, in five equal payments of 5 cents
each, in 6, 12, 18, 24 and 30 months. The
offers were all accepted by those present.
This proposition to be binding must be rat-
ified by two-thirds in number and one-half in
value of all creditors interested.A correspondent of the Sharon, Pa., Her-
ald gives rather a gloomy account of the
iron trade in the Shenango Valley. He says:
The situation in the valley, from Sharps-
ville to Middlesex, including both places, is
at present writing, September 9th, not very
glorious, judging by outside appearances.
We now have in this line of eight miles 22
blast furnaces and 5 rolling mills. Of the
blast furnaces there are four in operation,
and of the mills there are two.

CORPORATE MARK,



Joseph Rodgers & Sons'

(LIMITED)

CELEBRATED CUTLERY,

No. 82 Chambers Street, New York.

P. & W. CLATWORTHY, Agents.

The demand for Joseph Rodgers & Sons'
productions having considerably increased, they
have, in order to meet it, greatly extended their
Manufacturing Premises and Steam power.
To distinguish Articles of Joseph Rodgers
& Sons' Manufacture, please to see that they bear
the Corporate Mark.

I. R. SPENCER & SON,

Albion Steel Works, Sheffield

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK,



Granted 1749.

ALFRED H. HILDICK,

12 Warren St., N. Y.

Importer of CHAINS, ANVILS, VISES, &c.

Agency of
HILL BROTHERS & CO., WALSALL, ENGLAND,
GENERAL HARDWARE MERCHANTS,
And of

BALL'S PAT. SOLID STEEL SHEEP SHEARS.

These shears are unsurpassed for cheapness, dura-
bility and utility. They are made of one solid piece
of steel from point to point, and cannot be broken in
use either in the bow or at the junction of the shank
and blade. Samples can be seen at above address, or
sample lots furnished.

KRAUSS & HAHN,

Importers, Manufacturers and Dealers

In all kinds of

Cutlery and French Grindstones,

152 Centre, cor. Walker St., N. Y.

Ground sides Razors of all brands imported and
reconciled by steam power for the trade. Price for
concealing from \$3 to \$5 per dozen. Price list sent on
application.

S. H. & E. Y. MOORE,

68 Lake Street, CHICAGO, ILL.,
Heavy Hardware & Railway Supplies.

AGENTS FOR
Providence Tool Co., Reading Bolt & Nut Works, Syracuse Bolt Co.,
And Other Manufacturers.



CLIMAX BARN DOOR HANGERS, MOORE'S

Anti-Friction Sliding Door Sheaves,
" " Parlor Door Hangers,
" " Baggage Car Door Hangers,
&c., &c.

We invite the attention of the trade and of architects to the accompanying cut of Moore's ANTI-FRICTION PARLOR DOOR HANGER. It is by far the Simplest, Strongest, Most Durable, Easiest Working and Most Readily Adjusted Hanger ever made for Parlor Doors. It runs on $\frac{1}{8} \times 1\frac{1}{2}$ flat iron track, and is absolutely noiseless in operation.

Depot for goods of our manufacture:
FERNALD & SISE, 100 Chambers Street, New York.
E. & C. GURNEY & CO., Hamilton, Canada.

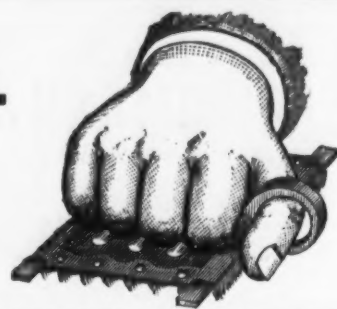
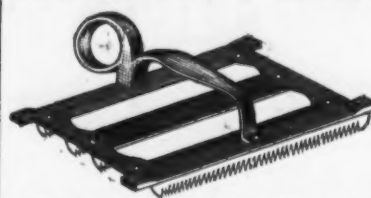
MIRROR STOVE POLISH.

It will COVER MORE SURFACE than any other in the market, and is the ONLY BLACKING that can be applied to a HOT STOVE, or that will receive a POLISH AFTER IT BECOMES DRY. Send for sample.

Manufactured by
S. H. & E. Y. Moore.



HOTCHKISS' Novelty Combs.



We ask the attention of the public to our Patent Novelty Curry Combs, represented above, which are universally acknowledged to be far superior to anything in the market, being neat and durable and the most convenient to handle of any comb yet produced. They are put up in paper boxes of one dozen each, and packed 24 dozen in a case. GIVE THEM A TRIAL. For Sale by the Jobbing Hardware, Saddlery and Woodenware trade.

HOTCHKISS' SONS, Bridgeport, Conn.

Philadelphia "STAR" Bolt Works.

NORWAY IRON FANCY HEAD BOLTS,
Carriage & Tire Bolts. Star Axle Clips, &c.
TOWNSEND, WILSON & HUBBARD, 2301 Cherry St., Philadelphia, Pa.



W. P. TOWNSEND & CO.,
PITTSBURGH, PA.,
Manufacturers of every description of First Quality,

RIVETS.



One-sixteenth to five-eighths diameter.
Heads and points to sample.
IRON, STEEL and BRASS.
Lyon & Fellows Mfg. Co.,
Cor. 1st and North 3d Streets, Williamsburgh, N. Y.

FENCE WIRE.

Nos. 6, 7, 8, 9 and 10, for using plain.
Nos. 12, 12½ and 13, for making into Barb Wire.
No. 20, for Harvester Wire.

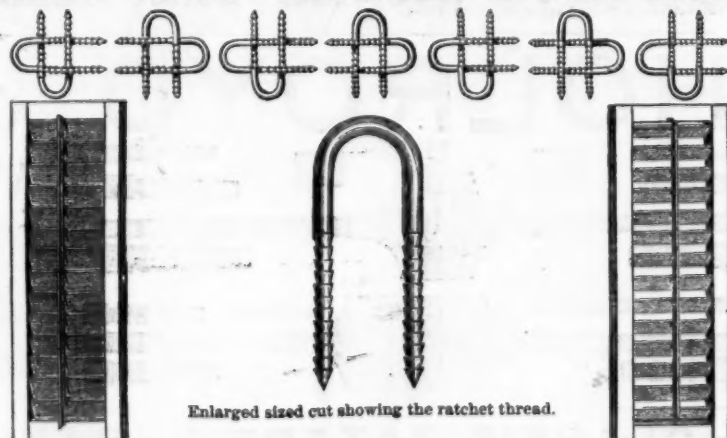
Send for prices and samples.

Lewis, Oliver & Phillips,

91 & 93 Water Street,
PITTSBURGH, PA.



Patent Improved Cone Pointed, Ratchet Thread, Steel Wire BLIND STAPLES.

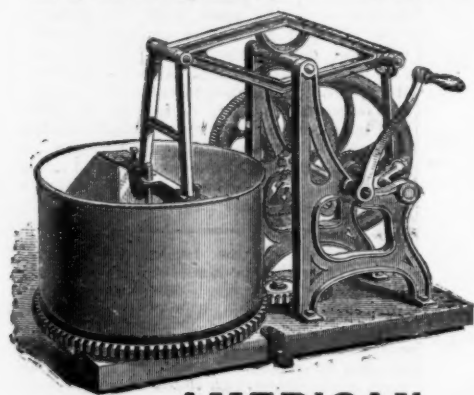


Enlarged sized cut showing the ratchet thread.

Will hold double the weight of any other Staple in the market, and drive as well either by hand or machine, and not split the wood.

J. LLOYD HAIGH,
Sole Manufacturer
81 John Street, New York.

ATHOL MACHINE COMPANY,



AMERICAN MEAT & VEGETABLE CHOPPER,

ATHOL, MASSACHUSETTS.

D. W. HOUGHTON, President.

J. S. PARMENTER, Treasurer.

D. A. NEWTON, General Manager.

Referring to above card, we take pleasure in advising our former patrons, and the trade in general, that we have made arrangements to sell and ship, in future, direct from factory, all goods of our manufacture. With location and shipping facilities unsurpassed, we can, at all times, guarantee to all points as low rates on freights as from either New York or Boston.

THE BAILEY WRINGING MACHINE CO., 99 Chambers Street, New York, who have handled our goods for the last three years, will continue to act as General Agents. Special quotations for export. Send for price list.



SIMPSON'S PATENT ADJUSTABLE VISE,

TENNIS & WILSON,

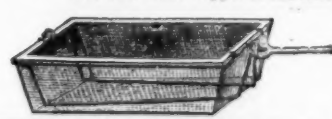
Successors to J. CLARK WILSON & CO. 81 Beekman St., New York.

SOLE AGENTS FOR

Snell Manufacturing Co., Davis Level & Tool Co.,
Wilson Manufacturing Co., Clark & Co., Taylor Mfg. Co.,
Oak Hill Manufacturing Co., Fisher & Norris, W. Hunt & Co.,
Bromwell Manufacturing Co., Nashua Lock Co., etc., etc.

Brilliant Corn Popper.

The Best Made Popper in the market.



Square, Full Braced, Wire Lid, Brilliant Wire.



Round, Full Braced, Tin Lid, Brilliant Wire.

LITTLE GIANT NUT CRACKER.

The Only Perfect

Nut Cracker.



Circulars sent on application.
Special Prices made to the trade.

HAYDEN & SMITH, Auburn, N. Y.,

Manufacturers of

Carriage and Saddlery Hardware,

Owners of

LAMB'S PATENT

Seat Fasteners.

The Safest and only reliable Seat Fastener for Wagons.



FRANKLIN S. MILES,
Manufacturer of
Brass, Iron, Steel and German Silver
SCREWS.
205 Quarry Street, Philadelphia.

THE PRATT & WHITNEY CO.,

Hartford, Conn., U. S. A.,

Make specialties of

DROP HAMMERS,

Punching Presses, Hand Drilling Machines, Ratchet Drills, Combination Lathe Chucks, Cutters for Teeth of Gear Wheels, Screw Plates, Hand Machine, Nut and Pipe Taps, Bolt Cutters, &c., &c.

R. COOK & SONS,

Manufacturers of

Carriage & Wagon AXLES.

WINSTED, CONN.

ESTABLISHED 1859.

H. D. SMITH & CO.,

Plantville, Conn.,

Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

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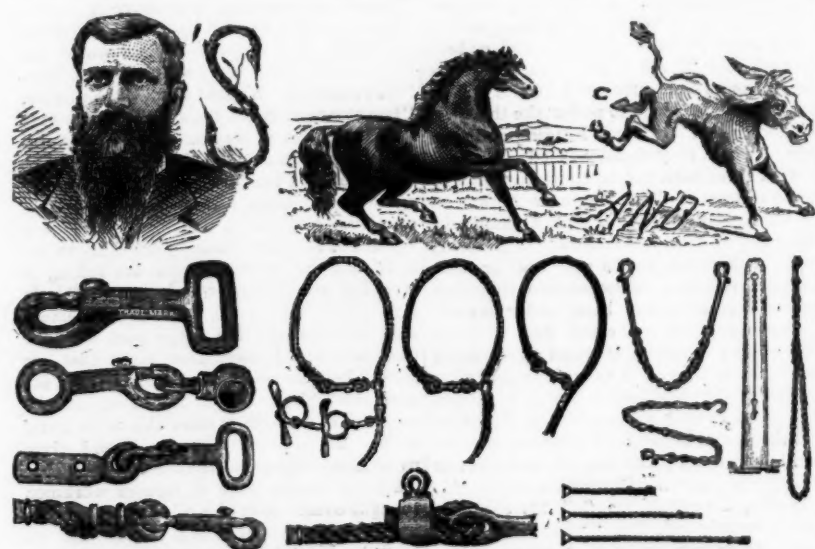
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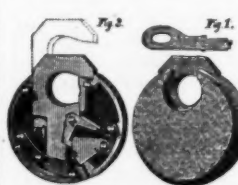
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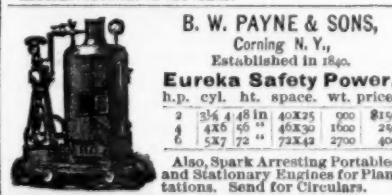
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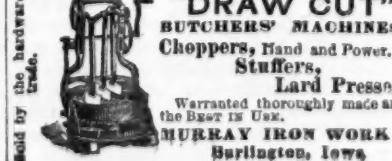
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View before Alteration. Reduced from Plate 4.

View after Alteration. Reduced from Plate 5.

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AND
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Eleventh Page.—Wire Rope as a Substitute for Chain Cable. Invention of Gas Lighting.
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Fifteenth Page.—The American Institute of Mining Engineers.
Seventeenth Page.—The American Institute of Mining Engineers. (Continued.) Metallurgical Notes. Scientific and Technical Notes. Mining Items. A New Bridge at Lebanon Valley.

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Twenty-third Page.—Richmond. Baltimore. Louisville. Cincinnati. Foreign. Our English Letter. Industrial Items.

Twenty-fourth Page.—Industrial Items. (Continued.) A Report upon the Use of the Electric Light at Paris.
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Thirty-first Page.—New York Wholesale Prices. (Continued.)

Thirty-second Page.—Philadelphia, Buffalo, Chicago and Pittsburgh Hardware and Metal Prices.
Thirty-third Page.—Boston and St. Louis Hardware and Metal Prices.

The great incubus on many of our lines of railroad is their leases of feeders or guaranties of interest on bonds or dividends on stock. These obligations have been entered into in flush times, and the rates of interest or dividends are those that could well be afforded at such times. It is this, as is well

known, that troubles the Pennsylvania Railroad. The main line to the present time would be paying good dividends and its stock be at par or above, were it not for the drain on its income to meet the engagements entered into with what are known in railroad parlance as "leased lines." It will be remembered that at the last meeting of the Pennsylvania Railroad Company a proposition was adopted to establish a sinking fund of 2 per cent. of the net earnings for the purchase and relief of the securities on which they are virtual endorsers. The first purchase under this action has just been made by them, in the neighborhood of 4000 shares of the Cleveland and Pittsburgh Railroad stock, at a discount of 16 to 18 per cent. As the company guarantee 7 per cent. on this stock it makes somewhat of a saving, though in proportion to the entire amount for which they are responsible it is quite small. However, the plan seems a good one, and as the finances of the company get in a better shape, more can each year be devoted to the relief of these securities.

The English Failures.—Trade in England and France.

The suspension of the City of Glasgow Bank, and the other great failures in London, Liverpool, Manchester and Glasgow, some of them the most important since 1857, invest everything relating to the trade movements now going on in Western Europe with special interest. We have therefore examined the latest official Board of Trade returns and government statistics in England and France having reference to the first eight months of the current year, as compared with the same period in 1877. For the convenience of comparison we have reduced everything to dollars:

	England.	France.
Import.....	\$1,276,932,455	\$567,632,207
Export.....	641,823,975	420,534,800
Total.....	\$1,918,756,430	\$988,167,007

	England.	France.
Import.....	\$1,321,408,170	\$476,891,600
Export.....	652,840,465	446,005,200
Total.....	\$1,974,248,635	\$922,896,800

Recapitulation.

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The coal export shows a slight increase, from 10,535,388 tons to 10,633,099, while the decline in value has decreased the amount from \$27,050,875 to \$25,380,425. The export of twist is on the increase, having risen from 147,162,300 pounds last year to 168,436,200 this year. There is, however, a notable decrease in the amount of cotton goods exported, which declined from \$189,183,050 to \$175,628,305. The same may be said of the iron and steel branch, which from \$66,468,505 fell to \$62,276,910. Linen goods were \$20,565,960 in 1877 and \$19,503,780 during the 8 months of this year. Quite a decline is also noticeable in woollens, which gave way from \$58,594,210 in 1877 to \$56,692,905 this year.

During the eight months under review the import of grain and flour into France in 1877 has been \$34,289,200, whereas this year it was \$51,605,600. France imported cattle last year to the amount of \$21,025,800, while this year she drew from abroad \$32,108,200. Of fresh and salted meat she imported this year \$10,000,000, against last year \$5,400,000. Of tallow, lard, &c., France imported this year \$12,000,000 worth, while last year the amount was but \$7,400,000. The importation of wine this year was \$7,400,000, against only \$3,400,000 last year. An extraordinary increase is noticeable this year in the import of raw silk, which has been \$46,656,000, against \$23,878,200 in 1877, nearly doubling it. Cotton shows an excess this year of \$3,400,000, and wool one of \$2,000,000. The import of coal into France has been to the amount of \$20,849,600, against only \$19,108,000 in 1877.

It is interesting to note the progress made in the importation of lumber and staves for the same period:

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"ever preyed on a confiding country." After such a condemnation as this it will hardly be necessary for them to mention defalcation, in this country as proofs of our deeper wickedness.

An important question affecting blast-furnace practice and location, as well as the mining of certain grades of coal, has been brought forward by Prof. John A. Church, of Columbus, Ohio, in a paper presented to the American Institute of Mining Engineers at the Chattanooga meeting, on the mode of combustion in the blast-furnace hearth. Unfortunately it was not read, and therefore the opinions advanced and the changes suggested did not undergo the thorough discussion which would have undoubtedly thrown additional light upon the subject had it been submitted to the criticism of many whose experience entitles their opinions to the careful consideration of the profession. We submit to our readers in another column a summary of the contents of the paper, hoping that it may lead to a more thorough and general investigation of the subject. Prof. Church deduces from a theoretical examination of the mode of combustion in the blast-furnace hearth, that the opinion hitherto held concerning the superiority of hard, dense coke is erroneous, and that, if the coal is properly prepared, light coke made from less caking coals than hitherto used for metallurgical purposes is preferable. He pronounces the fears of ironmasters, that light coke will be crushed by the burden, to be without any foundation and to be disproved by facts.

The failure of the Glasgow Bank and the movements in English financial circles that have resulted, have shown a greater sensitiveness than was supposed to exist, if they have not developed an extensive unsoundness of trade. The advance in the Bank of England rate to 6 per cent. indicates a possibility of the depletion of its reserve, and will, if continued, be very apt to cause a home panic. In the iron trade, for example, which in that country is done on a very small margin (smaller now than ever before), an advance of from 2 per cent. to 2½ per cent. in the rate of discount means, if long continued, absolute bankruptcy to many works. The advance, however, has had one result that is a matter of congratulation to us. One object was no doubt to depreciate American securities and promote their return to this country in lieu of gold. It has failed of its object, for cable advices state that these investments are not affected by the action of the bank. Indeed, about the only government security in the world to-day that does not give any tokens of depreciation, increase in volume or uncertainty as to its value from war or from insufficiency of revenue to meet interest and provide a sinking fund for payment, is the United States bond, and timid holders who wish safe investments are keeping it.

The close ties of friendship and the family relations which connect the greater number of our foreign-born citizens with the subjects of European countries, have created a constant and rapid interchange of opinion as to the commercial and industrial activity of the respective countries of the new and the old world. In a certain measure the drift of this opinion, as to the relative prosperity of different countries, finds expression in foreign immigration, and therefore the latest official reports of the Bureau of Statistics may be said to show symptoms either of growing prosperity here or increasing depression abroad. During the month of September the arrivals at this port were 8955, against 6673 for the corresponding month last year; during the three months ending September 30, 25,263, against 20,109 same time in 1877. This seems to indicate that, although times are still "hard" here, there is a growing conviction abroad that the new world offers a more promising field than the old for commercial and industrial enterprise.

We have recently received the text of a legal decision which is of great importance, not only to stove manufacturers, but to all manufacturers who have any interest in design patents. We refer to the opinion of Judge Wheeler in the case of John S. Perry vs. George Starret: United States District Court. The decision was filed October 17, 1878. The case in point was whether the "Hecla" was an infringement upon the design patent for the "Argand." The decision affirms that it is, and orders a decree for an injunction, with costs, to be issued. Aside from the interest which the decision has for those connected with the manufacture and sale of the two stoves, the opinion of the court is of very great importance, since it lays down some new rules in regard to design patents, defining their function and extending their application and value. We think this case, in its importance to designers and manufacturers, is only second to that of the famous "Gorham case," settled a few years since.

We presented to our readers in last week's issue of the *Iron Age* the first abstract of papers read before the British Iron and Steel Institute at its Paris meeting, which will remain a memorable one in the annals of that influential body. In another column we give the main features of a paper read by Messrs. S. Thomas and P. C. Gilchrist, on a series of experiments made with different mixtures for lining Bessemer converters, with the object of effecting a total or partial elimination of phosphorus. While successful

to a limited extent only, these experiments teach much that is of permanent practical value. They throw new light on a subject which has recently attracted much attention, and as the trials extended to the addition of cheap basic materials thrown into the converter before introducing the pig, the records are highly interesting and deserve careful perusal. We shall in future issues give our readers other papers read at Paris which possess value for American metallurgists and manufacturers.

We print on another page the first part of our report of the very interesting meeting of the American Institute of Mining Engineers in the Lake Champlain District. The meeting was one of exceptional general and scientific interest. As usual at the summer and fall meetings the excursions were delightful, while the papers read at the several sessions were of exceptional value and interest.

The American Institute of Mining Engineers.

The meeting of the American Institute of Mining Engineers at Lake George, formally opened by a session at the Roger's Rock Hotel for the reading and discussion of papers on the 14th inst. will be one long and pleasantly remembered by all who were so fortunate as to be in attendance. Most of the members who were able to go went on the Albany night boat which left New York Monday evening, making a jovial company. Others joined the excursionists at Albany and the junction of the Troy Branch of the Hudson and Delaware and Hudson Canal Company's road, and near noon on Tuesday the whole company, numbering about 60, reached Ticonderoga. As those acquainted with the personnel of the Institute might expect, dinner was the first thing in order; the half hour elapsing between the arrival of the party at the Bailey House and the welcome sound of the dinner bell being devoted to an inspection of a mill for making paper stock from the fiber of a variety of willow indigenous to the locality, which is useless for timber and valueless for charcoal. The process was examined with much interest, and brought out a valuable practical suggestion from one of the members present—that a better business than is afforded by iron making or mining engineering could be built up by an enterprising man who should buy this pulp in bulk, flavor it with suitable extracts, presumably derivables from coal tar, and sell it in small packages for desiccated cod fish and cocoa nut. We are not prepared to say whether anyone will act upon this suggestion.

The dinner at the Bailey House was well served and well relished. This over, the company regretfully left the table and prepared for a walk to the Horicon Iron Company, near at hand. This establishment, owned by Mr. Cyrus Butler, has just been put in operation to work a new and very interesting process for the production of a fine grade of iron direct from the ore. While still in the experimental stage the process seems to be an improvement over the method of reducing the ore in the old Catalan forge, and gives promise of success with rich ores and favorable conditions. It has been devised and put into execution by the superintendent of the company, Mr. W. Hooper. The ore is delivered at the works in a fine state, after having undergone a dressing operation at the mines. It is passed through a screen, the fine and the coarser material being fed into the furnace by different means. The plant consists of four forges in a block. Two of them are fed from the top with coarse ore mixed with charcoal, through a hopper leading into a vertical brick chamber holding about three tons of ore. The hot gases from the forges pass along this chamber and heat the ore in it to a dull red, thus materially reducing the consumption of fuel. The ore falls on a fire-brick shelf, from which it is drawn into the fire as the exigencies of the process require. The fine ore is utilized in a peculiar manner. In sifting it out of the ore on the top of the furnace it falls directly into a double hopper, through which it is supplied to two each of the four forges. The pairs served by it are not the same that are fed by the coarse ore hoppers, which, as has been mentioned, supply two forges the rear parts of which touch. The forges receiving their supply from one fine ore hopper are the pairs of the block placed side by side. This arrangement, while it is not an essential one, simplifies the construction. From the hopper the fine ore is drawn by a screw through a pipe which passes through the upper part of the forge, where its temperature is somewhat raised by the waste gases; thence it is led by a small tube to the blast pipe, through which it is carried by the blast into the forge hearth. The blast itself is also heated to about 300° F., its pressure being about 1.75 lbs. For the maintenance of the proper temperature the chimney valve is mainly relied upon. It will be seen that the chief aim of the inventor has been the reduction of the enormous waste of fuel which characterizes and hampers the utility of the Catalan forge. It is stated that the efforts made in this direction have led to a saving of 200 bushels of charcoal per ton of iron, the present consumption being only 100 bushels. At the Horicon Works the forges are so worked that the product obtained is one of superior excellence. This, it is true, is reached only at a sacrifice of large production. A bloom weighing from 200 to 225 lbs. is made in three hours, while it would be possible to produce in the same period by driving as much as 350 to 400 lbs. The bloom after having been drawn out of the forge is shingled under a steam hammer and is then reheated in a Sweet re-heating furnace. We learn that the large amount of cinder flowing from the bloom leads to some inconvenience as the furnace is now constructed, so that some modifications facilitating the tapping are contemplated in a second furnace soon to be built. After reheating the iron is billeted, in which shape it is marketed. The next point of interest visited was the works of the American Graphite Company, in which the plumbago ores of the region

are crushed and treated for the production of various grades of graphite adapted for various uses. The mill is said to be very complete in its appointments, and the process employed is the outgrowth of long and persistent experiments. The principle upon which the processes are based is to purify as far as possible with the aid of water, and then use air as a medium. The product of the mill is further treated at Jersey City. The ore, which varies in richness from 6 to 70 per cent., is all crushed, as even the purest is too gritty to satisfy the strict requirements of the Dixon Crucible Company. After examining much of the process of treating and concentrating the plumbago, the party were conveyed in carriages to Fort Ticonderoga, which was leisurely examined, some wandering about in their own way, while others gleaned scraps of doubtful history from a venerable citizen who was probably one of Ethan Allen's followers on the memorable occasion of his capture of the fort. We do not know whether the gentleman claimed this distinction, but it was universally accorded him, and for fear of doing him injustice we will accept the story as probable. As afternoon merged into evening and the sun manifested a desire to set, which farmers say characterizes hens at certain seasons of the year, the company climbed back into the carriages in waiting, and were drawn by prancing steeds over dusty roads to the Roger's Rock Hotel, where the arrangements had been made for supper and lodging. This hotel deserves a passing compliment, which we are glad to be able to pay it. Its location is superior, commanding a beautiful view of a portion of Lake George. It is attractive inside and out, and, although opened four years ago, the neatness and elegance of its table service and furniture gave the impression to many that it was a new hotel seeking patronage by delusive show of superior accommodation. In a word, it is a nice hotel, well kept.

The first session of the institute was held in the pleasant parlor of the Roger's Rock House, Tuesday evening, President Eckley B. Cox in the chair. As this was Mr. Cox's first occupancy of the chair as president, his address, of which we give an extract below, may be regarded as his inaugural. We regret our inability to print it in full.

MINING ENGINEERING AS A PROFESSION.

Mr. Cox began by calling attention to the fact that the profession of mining engineering was comparatively new in this country. Thirty years ago there were scarcely any educated mining engineers here and few in England, and there was no institution in which a young man could study this profession in the English language. The few we then had worthy the name of mining engineer had mostly studied on the Continent or graduated from the school of practical experience. Their work consisted principally in making surveys and maps of mines and mineral properties, geological surveys and analyses of ores. The inducements were too small to encourage young men to enter the profession, and those who did were commonly regarded merely as baits with which unsophisticated capitalists were to be caught. His opportunities for professional success and usefulness were small, he was compelled to compete with unprincipled adventurers and charlatans, and the profession as a profession had no recognized status. Within a comparatively few years all this has changed; the mining engineers, in the broad sense in which the term is understood by the institute, have become the indispensable allies of capitalists in all undertakings looking to the development of our great and varied national resources, and the profession is now regarded as one of great importance, with a valuable literature peculiarly its own.

Mr. Cox examined at length the causes of this change, which he believed to be the general development of the country and a better understanding of the value of expert work in whatever pertains to mining and metallurgy. He then examined some of the conditions which now determine the success or failure of such enterprises, and showed how, in the future even more than now, the educated mining engineer and metallurgist will control our progress in the development of those resources which will add so much to the wealth and prosperity of the nation.

As an illustration of the value of expert work in connection with anthracite mining, he gave a history of the experiments in the separation of slate from coal by jigs, showing how for several years the trade in this country had blundered along, traversing ground already gone over in Europe only to find out at last that what they needed had been in successful use during most of this time in Saxony. A very small part of the money and labor expended in these experiments, if devoted to the employment of experts, would have given them the results of foreign experience, which are better than any they had reached empirically.

Looking forward to the probable happenings of the next few years, Mr. Cox predicted a brilliant future for the educated, conscientious and ambitious mining engineer. His grounds for this prediction were clearly set forth, and were chiefly found in the fact that the great resources of this country were destined in future to possess an international importance, and to enable us, with other favoring conditions, to produce largely for other countries. We quote his conclusion as follows: "Now, fellow members of the American Institute of Mining Engineers, what is our share in the great work? How can we best aid in bringing about this desirable result? By directing intelligently, vigorously and honestly the active resources of the country into the proper channels; by preventing them from being turned away into the thousand ditches and swamps which lie upon all sides, ready to absorb here a little and there a little, and producing nothing but puddles of dirty water which will only serve to foul the reputations of those who caused them. If we should be employed to superintend the opening of a mine, the erection of a furnace, the building of a rolling mill, or in any other work connected with mining or metallurgy, let us not undertake it unless we feel that it is really within the branch of engineering in which we are experts, and capable, after having thoroughly studied the question, of carrying it

through to a successful issue, provided nothing which we could be expected to foresee should occur. In the next place, let us satisfy ourselves that the enterprise has a *raison d'être*, that is, if properly managed it can defy any competition it is exposed to; and in considering this question let us not shut our eyes to any circumstance that may not have an influence upon the question. If after our examination we feel sure that the risk is too great we should state it to our employers openly, plainly, explicitly, without regard to the fact that we are sacrificing our own position; it is our duty and it will pay us in the long run. If we merely have doubts, state them. Those whose money will be at stake are, of course, the proper persons to decide whether the risk shall be taken, but we should be sure if they do not thoroughly understand the question that it is not from any want of honest effort on our part to make them do so. We should arrange our works to use machinery as much as possible instead of men, and it is of great advantage if you can have two classes of workmen only—intelligent, highly skilled mechanics, who are well paid and worth their wages, and ordinary laborers. It is well to avoid those who are neither fish nor flesh, neither good mechanics nor ordinary laborers, knowing too much to be willing to do ordinary work and not enough to be employed as skilled mechanics. We should endeavor to keep ourselves *au courant* with what is going on, being ready to adopt every real improvement, but not every brilliant idea which has not been tested practically. And when our work is finished we should feel that we have done everything in our power to produce the most perfect work with the resources at our disposal at the least cost to our employers. If the works are managed by us when in operation the same rule should guide our actions, and if, after an honest, conscientious effort to bring the operation to a successful conclusion, it should fail—for the mining engineer cannot say with Richelieu in the play, "There is no such word as fail"—we should be able to write upon the ruined stack or the deserted shaft-house: "Tout est perdu, fors l'honneur."

Mr. Cox's address was listened to with close attention and was rapturously applauded. Each engineer present, as he wiped from his eyes the tears which could not be restrained, mentally resolved to decline henceforth all professional work which was not certain to pay his employers a handsome annual profit, and on which, in the event of accidental failure, he could not write an appropriate French quotation. Fortunately, there was no discussion, or several of the gentlemen present would have been forced to confess that in certain instances they had refrained from advising employers not to undertake enterprises which had proved unsuccessful.

The first papers of the session deserve to rank among the most valuable contributions to scientific literature which have been brought out by any society conducting its proceedings in English. They were read by Dr. J. A. Dudley, of the Pennsylvania Railroad. They were entitled respectively: "Chemical Composition and Physical Properties of Steel Rails," and "Does the Wearing Power of Steel Rails Increase with the Hardness of the Steel?" We shall have the pleasure of presenting careful abstracts of these essays in future issues. They were recognized as possessing so great an importance that immediate discussion was deemed impracticable, as it would be impossible to do justice to the very thorough and exact investigations of Dr. Dudley until opportunity had been afforded the members to study his figures and carefully examine the conclusions he had drawn from them. On motion of Dr. Raymond, it was decided to request the council to make the discussion of Dr. Dudley's papers a special order for the next meeting.

President Cox next presented a brief communication, calling attention to

A PECULIAR VARIETY OF ANTHRACITE, of which specimens were presented for examination. It is known among the workmen as "iron gray" or "cast iron." It has a dull, greasy appearance, as if an ordinary piece of anthracite had been rubbed with a greasy rag and allowed to dry. It was formerly considered a very impure coal, containing a high percentage of ash, and was picked out of the coal and thrown away; but the following analysis by Prof. J. Blodgett Britton, of Philadelphia, shows that it is quite as good a fuel as ordinary anthracite:

Water.....	4.36
Volatile combustible matter.....	3.48
Ash.....	7.26
Fixed carbon (by difference).....	84.90
Total.....	100.00

The carbon is to some extent in the nature of graphite and slowly combustible. The following is an analysis of the ash:

Silica.....	25.66
Alumina.....	27.03
Ferric oxide.....	42.83
Lime.....	1.56
Magnesia.....	1.83
Manganous oxide.....	.11
Sulphur.....	.17
Phosphoric acid.....	.21
Alkali, undetermined matter and loss.....	.60
Total.....	100.00

Before adjournment Dr. Raymond, on behalf of the Joseph Dixon Crucible Co., whose representatives were too modest to speak for themselves, made a very felicitous speech, in which he presented to the members and guests of the institute specimens of the pencils manufactured by the company, graded and put up in very neat cedar cases, as a memento of their visit to the source from which so much of their plumbago is obtained. The meeting then adjourned.

THE TOUR OF LAKE GEORGE.

Early on Wednesday morning the company assembled on the dock of the Roger's Rock Hotel and embarked on the steamer Ganouskie for a trip around Lake George. This little steamer is 70 feet long, 22 feet width of beam, and draws 7 feet of water. She is built entirely for passenger accommodation, and is a most agreeable conveyance for parties desirous of visiting the various points of interest on this very beautiful lake. Of the sail we can only say it was greatly enjoyed. The weather was exceedingly fine, and the mountains which in-

close the lake are now glorious with the variegated hues of autumn and glow like vast cones of flame through the golden mists of October. Dinner was served at the Hundred Islands House, and the foot of the lake was reached by 4 o'clock in the afternoon, where a train was in waiting to convey the party to Port Henry. On the way a passing visit was paid to the furnaces of the

CROWN POINT IRON COMPANY.

now in blast. The plant consists of two blast furnaces, 60 feet high and 16 feet bosh, the working charges of which are 4000 lbs. of coal, 4600 lbs. of magnetite ore and 2120 lbs. of flux, the average number of charges being thirty, while the usual blast pressure is 6½ lbs. One of the furnaces has an old Scotch hot-pipe stove, heating the air to about 950° F., while the other is served by three Siemens-Cowper-Cochrane stoves, elevating the temperature of the blast to 1600 degrees. The working of these furnaces was critically examined by the members, whose impression seemed to be that while the stove is durable, reliable and highly effective, there might be some difficulty in cleaning it rapidly and thoroughly. The coal used for smelting is Pennsylvania anthracite, which is carried to the works by rail. The limestone used as flux contains from 16.5 to 18.5 per cent. of magnesia, as it has been found that it is necessary to make a more refractory magnesian cinder in order to obtain the required grades of iron. Steam is generated by the waste gases in two batteries of boilers of four each. Their length is 54 feet and their diameter 35 feet. The blowing engines, peculiar in construction, are designed by Mr. F. Rumpf, of the West Point Foundry. The stroke of the steam piston is larger than that of the air piston. The product of the furnaces is about 55,000 tons of Bessemer pig. The chief grades made are Nos. 1, 2 and 3, the average composition of the product being 2.67 of carbon, 137 of sulphur, .007 of phosphorus. Extensive docks and trestle work facilitate the handling of the raw materials and the product. The ore is obtained from the company's mines, of which we shall have occasion to speak hereafter. The members then reentered the cars and soon arrived at Port Henry, where the party divided into two companies in order to adapt themselves to the moderate accommodations of the local hotels, but reassembled about 8 o'clock in the Port Henry Opera House for an evening session.

THE FIRST SESSION AT PORT HENRY.

The first paper of the evening was read by Mr. D. Torrey on the Wheeler process of welding steel and iron without the use of fluxes. This paper described the manipulations followed in the well-known Wheeler process, and very clearly explained its several features of scientific interest and practical value. Mr. Torrey explained that the union of iron and steel by this method was effected by causing a more or less complete fusion of the inclosed steel, while the encasing wrought iron, which only attains a high welding heat, protected it from oxidation. That the steel is really fused was shown by the fact that after the mass had been rolled sufficiently to make it compact it must be allowed to cool a while before the rolling could proceed. Were this precaution neglected the iron box might be burst in the rolls and the molten metal spurted over the mill. The various economies of the process and the uses of the resulting product were explained, and samples of combined iron and steel rolled in various shapes were shown. As only a few minutes were allowed for discussion nothing of importance was elicited.

The second paper was read by Mr. John M. Hartman, of Philadelphia, on "A New Teyere Pipe." This teyere was illustrated and described in *The Iron Age* of Sept. 12, and to this description we refer the reader. In the discussion, Dr. Raymond related his experience with the old bronze teyeres at Durham, N. J. The temperature of the hot blast was there 1000° F., the highest obtainable with cast-iron teyeres. They could be taken out easily, be kept clean, but still they could not be kept tight. Their cost was \$30 and only \$45 could be obtained for them when taken out. Compared with this, \$10 only was paid for an iron coil teyere. It was found at Durham that while the teyere stood well when the furnace was working regularly (not one was changed in six to eight months), it could not withstand the contact with molten metal when the furnace was working irregularly. In the discussion which followed, Mr. Hartman stated that the composition of the metal had undergone a change within the last few years. It was found that when the alloy was richer in copper it resisted better, and now it virtually consisted of that metal with just enough alloying to insure a solid casting.

The next paper on "A New Determination of the Coefficient of Friction of Lubricated Journals" was read by Prof. R. H. Thurston, of the Stevens Institute of Technology. This paper is one of great value to engineers and other users of lubricating substances, and gives the results thus far attained in what promise to be a most important series of tests. It is too long, however, to embody in our report of the proceedings, and without the tables no summary could be made which would correctly epitomize the author's conclusions. We shall refer to this paper in further issues.

Mr. H. M. Howe followed with a discursive talk about the defects of the Siemens and Fönsard regenerative systems and the application of carbonic acid for gasifying the fuel in the producers. This, he claimed, would prevent too high local heats and the attending evils of clinkering and rapid wear, and make the regenerative systems with their economy of fuel applicable to the metallurgy of the more volatile metals. Applied to copper smelting in Chili it was found that, compared with the common method in reverberatory furnaces, the loss of copper was 30 to 40 per cent. of that formerly suffered; the copper in the slag was 39 per cent. less and the regulus 10 per cent. higher in copper. He then described a new direct process for the manufacture of ingot copper, instead of Chili bars (holding 96 to 97 per cent. of copper), direct from oxidized ores or metallurgical products. The process has been applied in Chili and has been found to yield excellent

AMERICAN SCREW CO.,

Providence, R. I.,

**MANUFACTURERS OF MORE THAN 4000 VARIETIES OF PRODUCT,
AND INCREASING THE ASSORTMENT DAILY.**

Machinery employed contains important inventions recently patented, and which are designed to produce Screws at a **lower cost to the consumer** than has ever been attained.

All goods are distributed through the Hardware trade, to whom a liberal discount will be allowed.

INTERNATIONAL EXHIBITION. PHILADELPHIA, 1876.

(No. 235.)

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons, and decreed an award in conformity therewith.

PHILADELPHIA, November 8, 1876.

REPORT ON AWARDS.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz: **Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.**

G. L. REED. Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz,
Jas. Bain,
Chas. Staples,

G. L. Reed,
J. D. Imboden,

J. Diefenbach,
Dav. McHardy.

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards.
Given by authority of the United States Centennial Commission.

A. T. GOSHORN, Director-General.

[L.S.] J. L. CAMPBELL, Secretary.

J. R. HAWLEY, President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

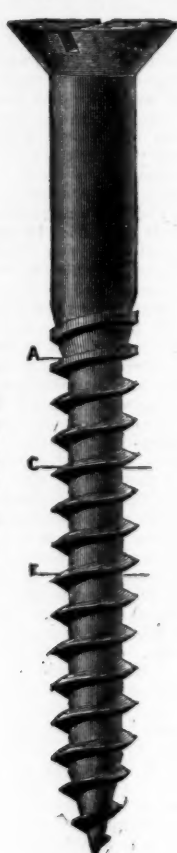
Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all

1776.



1846.

Patented August 30.

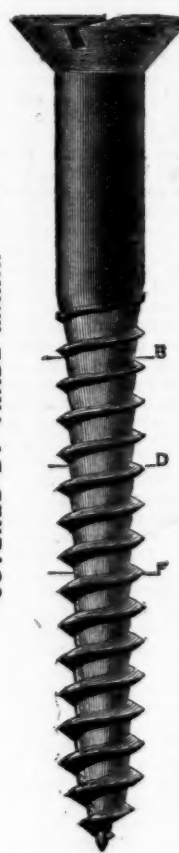


Section at Line A B
Section at Line C D
Section at Line E F

1876.

Patented May 30.

COVERED BY TRADE MARK.



Section at Line A
Section at Line C D
Section at Line E F

Estimated to be FIFTY PER CENT. stronger than a Screw as Commonly made.

the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

results. The reduction is effected by producer gases of the modified system, briefly referred to in the above. They are passed through a vertical retort, and in four to five hours reduce the oxides to copper sponge, which is allowed to cool in the retort. Solid fuel when similarly applied for reduction would only yield cupriferous pig iron. The sponge produced is found to be practically free from iron, and the slag held only 1 1/2 per cent. of copper, while the ingot held only 1 1/2 per cent. of impurities, chiefly iron and sulphur. A peculiar formation of hairs of copper 1-16th of an inch thick and 1 inch long was found in the copper sponge produced by this direct process.

The programme for the remainder of the excursion provided for so many features of interest, including one session for the reading of papers, that we are compelled to defer our report of what follows until our next issue. We have only space this week to give our readers a copy of a dispatch prepared by an enterprising press correspondent for transmission to the Associated Press. A well-informed member who was asked to revise it for correction induced the correspondent not to send it, but as a summary of the proceedings up to the close of the meeting on Wednesday night it is too interesting and valuable to be lost. We print it verbatim:

PORT HENRY, Oct. 16, 1878.

[To the Associated Press, New York.]

The American Institute of Mining Engineers is holding its regular fall meeting here, which is largely attended. Yesterday was devoted to Ticonderoga and vicinity, and visits were made to the graphite works and forge, where the new process of making lead out of the fine ore by means of charcoal was exhibited. It formerly took 300 bushels of fuel to make a ton of billets, but by a new process this is saved, and the heat formerly wasted is used to operate the water wheel of the mill. The preparation of the iron ore for making stove polish, pencils and gas retorts was also exhibited. Fort Ticonderoga was visited, and the surrender of Ethan Allen explained. The party then drove to Lake George, where they stopped at the Saddle Rock Hotel, and held a business meeting in the evening. The president, Mr. Eckley, welcomed the members, and gave them each a box of lead pencils. Two interesting papers on steel rails were read by Dudley Cox. He showed that any rail which contained over 20 per cent. of phosphorus, 10 per cent. of citrate, 25 per cent. of magnesia and 5 per cent. of carbon would not stand more than 400,000 tons in two to eight years, and would not stretch over 80 per cent. A trip on Lake George took up most of the daylight to-day, but a visit was made to Crown Point to see the new Cooper fire-place stoves in operation. This evening another meeting was held here, and a number of papers were read. Mr. Torrey described how by a new process employed in Chili a steel regulus was made to weld an iron box tightly and sustain a weight of 75,000 lbs. per square inch. Mr. Hartman described a new belly pipe made of two copper pipes bolted to the elbow strongly, which could be pulled out by a hook, and said that a good tynner always kept his nose clean. Prof. Stevens, of Hoboken School of Mines, read a valuable paper on grease, and showed the relative values of sperm oil, lard oil, kerosene and Albany grease. In the discussion Dr. Rossiter stated that he had used the bronze oils, but had gone back to the old-fogy lubricant. Mr. Howe addressed the meeting on the relative merits of the Siemens and Whitwell's furnaces, and demonstrated how with the former he could get 95 1/2 per cent. of steel scrap and have 30 per cent. of copper in his slag. He explained by an elaborate formula that if $f = 60,000$ the friction in the apparatus would amount to 1 1/2 per cent. only. To-morrow the institute will go to Montreal to visit the cheese ore bed.

(To be continued.)

Metallurgical Notes.

PURIFICATION OF PIG IRON BY MOLTED ALKALINE CARBONATES.

Dr. Thomas M. Drown, of Lafayette College, Easton, Pa., presented to the American Institute of Mining Engineers, at its recent October meeting, the results of some experiments on the purifying action of alkaline carbonates on the carbon, silicon and phosphorus of pig iron. A number of bars of pig iron were cast about one foot long and planed down accurately to one inch section. These were immersed in a large wrought-iron pot full of molten sodium carbonate, made by fusing the commercial bicarbonate of soda. This pot was kept at a reasonably constant high temperature for a long time in one of the hot-blast ovens of the Glendon Iron Works, Easton, Pa. One of the bars was removed from the pot every 24 or 48 hours, according to the rapidity of the action, and after cooling was broken and the fracture examined. The change from pig iron to malleable iron was progressively inward and always sharp and easily recognized, the rate of progression being in a decreasing ratio with the time. The temperature of the oven had evidently some influence on the rate of progress, but a sufficient number of experiments were not tried to settle definitely what temperature was the most favorable. In some cases the iron was converted on the surface to a black oxide, and the oxidation of the iron once commenced progressed at the same rate as the oxidation of the carbon, while in other cases the carbon was removed to a depth of 3-16 inch or more, while the surface of the bar preserved the original marks of the planer without a trace of oxidation. The following analyses of the successive layers of the bars subjected to this treatment, made by Mr. P. W. Shimer, show the nature and progress of the reaction between the carbon, silicon and phosphorus of the pig iron and the alkaline carbonate. Bar No. 1 was immersed in the bath for ten days, and the oxidation was noticed to have extended about 3-16 inch. After removing a small layer of scale two layers were planed off about 1-16 inch thick each and subjected to analysis, together with planings from the interior of the bar, and also of a portion of the same bar which had not been treated. The following are the results in duplicate:

	Original bar.	1st layer.	2d layer.	Interior.
Carbon.....	3.570	0.115	0.260	3.587
Silicon.....	3.554	0.101	0.378	3.587
Phosphorus.....	1.384	0.824	1.059	1.383
	1.373	0.810	1.120	1.370
	0.806	0.398	0.704	0.812
	0.872	0.494	0.690	0.910

The lack of close agreement in some of these duplicate analyses is without doubt due to the difficulty of getting average samples of the different layers. Bar No. 2 was identical in composition with No. 1. It was immersed seven days and showed a slightly greater depth of conversion than No. 1, without the least oxidation of the iron. It was planed in three layers, and the analyses resulted as follows:

	1st layer.	2d layer.	3d layer.	Interior.
Carbon.....	0.057	0.166	0.044	3.493
Silicon.....	0.574	0.567	1.381	1.356
Phosphorus.....	0.013	0.201	0.775	0.911

The first layer in bar No. 2 corresponds to the layer of scale or oxide in bar No. 1, hence the lower percentages of carbon, silicon, and phosphorus in the outside layer of No. 2. A bar of white iron 3/4 inch by 1 1/4 inch was immersed in the bath for 10 days, and on removal it was found to be sufficiently malleable to be forged hot to a point. The analyses of this bar and of the original white iron are as follows:

	Original	White iron.	Outside layer.	Interior.
Carbon.....	2.159	0.128	0.381	2.159
Silicon.....	0.947	0.781	0.910	0.910
Phosphorus.....	0.607	0.415	0.522	0.522

The reaction with the carbon of white iron is, as might be expected, much more energetic than with gray iron, and the conversion to malleable iron more quickly effected. No determinations of sulphur were made, but there can be no doubt that it would share the same fate as the other elements. The practical applications of this process will readily suggest themselves. The removal of the carbon, silicon and phosphorus from thin plates of cast iron could be effected in a short time, and the process becomes at once one for the preparation of malleable castings; or, the converted product might, when it had a suitable composition, be melted for steel. On the completion of his experiments, Dr. Drown was surprised to learn that Mr. A. K. Eaton, now of Brooklyn, N. Y., had discovered this action of alkaline carbonates on pig iron many years ago, and had patented the process in 1860. On consulting his patent specification it was found that he fully recognized all the reactions which have been described. His claim was for a new process of making steel. To quote from his patent: "The bars converted into steel by this process may be worked directly under the hammer or in rolls, or may be melted, cast into ingots and hammered." Although Dr. Drown does not claim more than having re-discovered a process which had been lost sight of, yet the analytical results given above, showing the nature of the process, will not be without novelty.

CORROSION OF STEEL BY SEA WATER.

Much has been said recently about the action of sea water upon steel, and much conflicting testimony is cited in proof *pro* and *con*. This state of affairs is likely to continue until some exact experiments have been made upon the subject. In such trials it will be absolutely necessary to carefully trace the effect of chemical composition of the material, as the following example, proving how differently various grades of steel act under the same circumstances will prove. It was cited by Mr. Gregg in discussing Mr. Adamson's paper on steel before the Iron and Steel Institute at its recent Paris meeting. Mr. Gregg had to put down two ropes three miles out into the sea for the purpose of pulling a tug out to clear a water course; the first one was made of so-called steel; it lasted six months, and then bent all to pieces from corrosion, or some other chemical effect which the salt water had upon it. He put down another one of steel, which had been down three years; he saw it the other day, and found it was as good as on the day it went down, thus showing, he thought—and there could not be the slightest doubt on the subject—that steel was not destroyed by salt water provided the chemical nature of it was such as suited the circumstances.

REROLLED IRON RAILS.

The Bulletin of the American Iron and Steel Association has published in recent issues some very interesting communications on the subject of rerolling iron rails. Mr. Daniel Tyler, president of the Mobile and Montgomery Railway Company, submitted the contract entered into by that company with the Woodstock Iron Company for the delivery of 1500 tons of iron rails 56 lbs. to the yard at \$25.50 per ton, with the following specifications: The railroad was to deliver 1500 tons of old rails to be converted into a pattern agreed upon; 33 per cent. of cold-blast Woodstock charcoal iron were to be added, and be so worked into the rail as to construct the head exclusively from it. The manufacture of the rail was to be the following: 1. The Woodstock cold-blast iron shall be puddled in a skillful manner, and worked into slabs by the muck bar being cut and piled and reheated and rolled into plates, say, 7 inches wide, 1 inch thick and of a proper length to form the pile from which the rail is to be rolled. 2. The best of the old rail shall be selected and cut and piled and rolled into slabs of proper length and thickness to form the bottom and flange of the rail. The bottom of the rail shall be cut, piled and rolled as above to form the part between the head and flange. 3. The pile as above constructed shall be well treated and passed through the rolls so as to insure a perfect weld, and rolled to a finished rail. The finishing process shall be done at a red heat, so as to insure hardness and smoothness of the rail. The pile shall be made of sufficient size, so as to admit of 3 feet in length to be cut off each end of the rail, so as to insure perfect and solid ends; and the whole rail shall be straightened and punched in a suitable manner for fish-bar fastenings. The said rails shall be rolled in lengths of 30 feet, less 10 per cent., which may be in lengths of not less than 25 feet. All of the above rails shall be finished in the best manner, and be free from cracks, flaws or defects of any kind. Mr. E. C. Cox, of the Philadelphia and Reading Rolling Mill, at Reading, Pa., in connection with this subject makes the following suggestions, to which his long experience lends great weight: The head-bar might be improved by one more heating and rolling; if the size of the rolls in the mill will admit of it, a larger rail pile is desirable, 9 inches square section being preferable to 7 inches, making the iron, by reason of its greater reduction, denser and consequently harder and tougher in the finished rail. The reheating of the rail pile after it is drawn down in the rolls to a bloom is a valuable feature in the way of perfecting the welds. This method has produced most excellent results on the Reading Railroad. The cutting off of three feet from each end of the rail is unnecessary, as one-half that length has been found to be amply sufficient to secure perfect and solid ends to the rails, with a very small percentage of short bars. Mr. O. W. Davis, Jr., of the Katahdin Iron Co., of Bangor, Me., in another communication, adds his experience on the comparative merits of a rail made substantially in the manner used at Woodstock with one capped with anthracite iron. The rails of both kinds were laid alternately in the yard of the European and North American Railway of Bangor, Me., and it was found that the rail capped with Katahdin charcoal iron outwore two sets of the ordinary rerolled anthracite iron rail. The cost of such a rail is \$8 less than that of a Bessemer steel rail laid down at that locality.

PRODUCTION OF THE METALLURGICAL WORKS OF PRUSSIA IN 1877.

We have just received the official report of the Prussian government, published in the *Zeitschrift für Berg-Hütt. u. Salinen-Wesen*, on the production of the metallurgical works during the year 1877. From the detailed amounts we take the following totals, given in metric tons:

Charcoal pig.....	41,593
Coal and coke pig.....	1,364,494
Pig from mixed fuel.....	59,749
Zinc.....	94,744
Lead.....	78,352
Copper.....	8,193
Silver.....	55,797
Nickel.....	757
Sulphur.....	1,198
Wrought iron.....	946,709
Bessemer steel.....	396,319
Open hearth steel.....	42,569
Crucible.....	6,966
Iron rails.....	30,724
Steel.....	293,996

Only 24 out of 57 converters, 10 out of 36 open-hearth steel furnaces, and 8 out of 11 crucible furnaces were producing during the year. Out of 52 charcoal blast furnaces 42 were in blast, and 144 out of 175 coke furnaces, while 6 out of the 7 furnaces which use mixed fuel, charcoal and coke, were working. Prussia has 2060 puddling furnaces, 1214 of which only were producers. Both of the rotary furnaces employed in Prussia were at work.

Scientific and Technical Notes.

Mr. F. G. Lloyd gives in *Nature* the following account of an experiment with a TELEPHONE WITHOUT A DIAPHRAGM.

Two ordinary electro-magnets—unscrewed from a couple of large electric bells—were fastened, by means of two little wooden saddles and a screw each, to a small piece of deal board about 4 1/2 inches square and 3/4 inch thick, in such a way that the poles were all but touching. Their wires were then joined so that poles of opposite denominations faced each other—i. e., north opposite south and vice versa. This, placed upon an empty cigar box and four Leclanché cells in circuit, gave out the tune of a musical box clearly and loudly in the room. When both poles were made to touch the sound ceased; but with a thin piece of paper or stout tinfoil between them, without any intervening air space, the sound was heard. On gradually separating the magnets the sounds grew fainter and fainter till they became inaudible. By putting the bass-board close to the ear whistling and singing to the microphone were very clearly and loudly heard; also the voice of the person speaking could be recognized; but words were hardly sufficiently defined to distinguish all that was said, though now and then parts were intelligible. One of the electro-magnets was afterward replaced by a small permanent steel horse-shoe magnet fastened to the board in a similar manner; the result was the same, but slightly louder, probably from there being less resistance. By varying the strength of battery, size or mode of mounting magnets or adjustment of the microphone, it is possible that perfect definition can be obtained. Thus it would appear that the electro-magnet, without any diaphragm whatever, can be made a reproducer of sounds transmitted by a Hughes microphone, and thus a complete and practical telephone system produced without the possibility of infringing anybody's patent.

Iron states that the problem of LIGHTING STREET LAMPS BY ELECTRICITY has been solved by Mr. St. John Lane Fox, who has successfully applied his apparatus to lighting the lamps in Pall Mall. Each lamp is provided with a small apparatus containing an induction coil, the primary wire of which is in the circuit of the line wire, so that a current sent through the latter traverses the primary of all the coils. The ends of the secondary coils of each lamp are in connection with insulating supports at the burner, so that when they are set in action sparks will pass across the aperture of the burner and ignite the gas. To turn the gas on and off at each lamp, Mr. Fox makes use of the core of the induction coil. This, when magnetized by a current of moderate strength, causes a permanent magnet, in connection with a stop-cock of peculiar construction, to be rotated on its axis, thereby turning on the gas. The effect of a reverse current is to move the permanent magnet in the reverse direction, and so to turn the gas off. This is effected by a battery and apparatus which are placed in a small wooden hut in Waterloo Place, and from which the insulated wire passes to the lamps, returning to the hut to complete the circuit, which in the present case is a mile in length. At the meeting of the Société de l'Encouragement of France, Mr. Paliard read a paper on

SULPHIDE OF CARBON AS A FIRE EXTINGUISHER. The products of

combustion are sulphurous acid gas and carbonic acid gas; there is no necessity to plug the chimney, and the cost of the sulphide is trifling. The firemen of Paris are stated to be expert in its use, and to have used it in January last in 32 out of 51 fires, in February in 81 out of 103 fires, in March in 138 out of 165 fires, or in 251 out of a total of 319 fires, the extinction being almost instantaneous.

MINING ITEMS.

COAL.

The following statement shows the comparative shipment of coal for the week ending October 12, and the respective seasons, which in the Lackawanna and Wyoming coal regions date from January 1, and in the Lehigh and Schuylkill regions from December 1. Tons of 2240 lbs.

REGION.	1878.		1877.	
	Week.	Season.	Week.	Season.
Lackawanna.				
D. & H. C. Co.	49,351	1,887,301	44,454	1,884,546
D. L. & W. Co.	72,729	1,880,465	64,931	1,874,106
Penna. Coal Co.	24,454	664,931	20,564	743,106
	123,534	3,832,697
Wyoming.				
Can. R. R. of N. J. Lehigh.	80,656	1,724,952	77,589	2,104,173
L. V. R. R.	68,764	2,850,498	113,086	3,655,408
Schuylkill.				
P. & R. R. R. Co.	302,058	4,778,205	189,082	6,154,127

The board of control of the anthracite coal producers resolved at a meeting in this city on Wednesday of last week that the production for November shall be 1,800,000 tons, the production this month being 1,200,000. The officers were directed to invite the various interests to a conference, with a view to an arrangement for 1879. The Black Star Coal Mining Co., California, have just discovered another ledge of fine coal 4 1/2 feet wide. The force of miners will be increased as soon as the mine is sufficiently ventilated to permit the miners to work.

The Sacramento (Cal.) Bee says: The Lincoln coal mine has recently changed hands, and the new management are now engaged in reopening an old shaft which has been allowed to become nearly filled up with sand and debris. It is claimed that a vein of bituminous coal exists here, and that by proper management it can be worked to advantage.

Last week's Brownsville (Pa.) Clipper says: A number of the coal mines in No. 4 pool, Monongahela River, have gone into operation during the past week, the men working at two cents, among them Morgan & Dixon, California; Excelsior Works, Ruthersford; Turnbull & Hall's, Troytown; Frazer & Frye, Fayette city; Clipper Works, Allenport; Tremont Works, Clarke's. There will in all probability be considerable coal mined along the Monongahela this winter.

Ocean mines, Pa., near Sutersville, are running about four days per week. Black Ball, Heath's and White Ball mines, at the same place, are working from two to three days per week.

It has been ordered that work in the mines shall be commenced on Monday, the additional allotment to the Philadelphia and Reading Company being about 170,000 tons. This will give the miners another week's work for October. After finishing the extra allotment it is likely work will be continued without interruption until the November quota of 343,500 tons is filled, requiring two weeks' work.

IRON.

It is said that the ore lands of the Belfont Furnace at Ironton, Ohio, contain sufficient ore to do the company 500 years.

COPPER.

The Calumet and Hecla Mining Company, of Boston, have declared their regular quarterly dividend of \$5 a share, payable November 15.

PRECIOUS METALS.

Rich gold discoveries are reported from Bath, where the Landaff Mining Company, composed of Newport (R. I.) and St. Louis parties, have just completed a \$50,000 mill, and are working out \$100 a day.

The Idaho Mine, Nevada, has paid 110 regular dividends, amounting in all to \$2,487,250. Already about 15,000 shares out of 20,000 being sold for a working fund to revive the Scadden Flat Mine, have been taken in Grass Valley, Nevada and vicinity. Ore coming from the second level west, in the Rocky Bar mine, is estimated worth over \$100 per load.

The Alaska G. and S. M. Co., have erected a 10-stamp mill at their works on Barnon Island, about 14 miles from Sitka. They have some 250 or 300 tons of ore ready to pass through the mill. The quartz, which is taken from a mountain about 5 miles from the tunnel, called Bald Knob, will average \$35 per ton; but selected quartz from the same locality will average from \$1000 to \$2000 per ton on an assay. From assays made in this city and elsewhere, it is known that the precious metal taken from Stewart's tunnel can be obtained in quantities to justify the working of the mine.—*Astorian*, Sept. 18th.

A new mining district, to be called the Potasi, 35 miles southeast from Kemper's, and about the same distance northeast from Winnemucca, is the latest sensation. Some of the ore is said to assay \$1000 per ton.

Bullion Shipments.—McCrackin, Oct. 1st, \$7251.91; California, Oct. 2d, \$59,854.03—total to date, \$290,937.24; Independence, Sept. 30th, \$6719.20; Bodie, Oct. 3d, \$12,250.53; 8th, \$16,000; Northern Belle, Oct. 2d, \$3949.20; total for Sept. \$58,430.94; Oct. 5th, \$4128.88; Grand Prize, Oct. 2d, \$2824.26; Ontario, Sept. 27th, \$3992.10; 28th, \$3229.50; 30th, \$3350.27; Oct. 1st, \$3628.48; Oct. 2d, \$3295.58; Oct. 3d, \$3092.92; Germania, Oct. 3d, \$280; Silver Reef, Oct. 2d, \$13,329.26; Hillside, Oct. 8th, \$6000; Navajo, Oct. 7th, \$7700; Homestake, Sept. 28th, \$13,500; Tiptop, Sept. 28th, \$10,000; Raymond & Ely, Oct. 1st, \$3100; Northern Belle, Oct. 2d, \$3900; 3d, \$4128.88; Oriental Consolidated Oct. 3d, \$3000; Star, Oct. 8th, \$3000; Tybo Consolidated, Oct. 4th, \$3755.25; Manhattan, Oct. 8th, \$11,500; Hackberry, Oct. 8th, \$6132.33; Hillside, Oct. 9th, \$5500; Leopard, Oct. 8th, \$4700.

There has been opened what appears to be a very promising silver vein on Gross Cap, on the Canada side of Lake Superior, nearly

opposite Point Iroquois, and about ten miles from Sault Ste. Marie. The rock shown is very similar to that at Silver Islet, and undoubtedly contains silver in paying quantities. The vein, which has been traced over a distance of 200 yards, is 18 inches wide at the outcrop, but widens out to 3 feet in sinking a depth equal to the width of vein. The vein where opened is at an altitude of 200 feet above the water level. Analyses which have been made are very encouraging.—*Mining Journal*.

The Victoria silver lead mine is situated about ten miles from Sault Ste. Marie, on the Canada side, and promises to develop into an exceedingly valuable property. Eighty tons of the ore were taken out last winter, which being shipped to Swansea, England, for treatment, was found to contain 37 per cent. of lead, and yielded 32 ounces of silver to the ton, the Swansea folks making returns for the same at \$32.50 per ton of rock received. The vein matter carries a width of 40 feet, with 18 inches of rich ore on each side, the intervening rock being lean. The owners claim that they can lay the ore down in Swansea at a cost not to exceed \$12 per ton, and if they can they doubtless have a fine-paying property. They are working a considerable force of men, have built a good wagon road from the mine to St. Mary's River, and are now putting in concentrators with a view of concentrating the ore to a standard of about \$100 per ton. The mine is owned by a party of Quebec capitalists.

MISCELLANEOUS.

The Los Angeles (Cal.) Star, of October 1, says: Within the past week Messrs. Henry Campbell, Robert Thompson, Richard Kichline and John Davis, of this city, discovered and located an immense deposit of plumbago in the San Fernando mountains, about 23 miles from Los Angeles and six miles from the railroad at Andrews Station. The deposit is some 50 feet in width and of incalculable depth, running through a mountain. It is incased in massive, solid quartz walls. Samples have been analyzed, showing 82 per cent. of the mineral. The location of the discovery is such that a wagon road can be constructed to the railroad with but little expense, and wood and water necessary for its purification and manufacture into the various articles for which it is adapted are found in profusion in close proximity.

A New Bridge at Lebanon Valley.—A correspondent of the Reading Times says: The construction of the new and permanent Lebanon Valley bridge over the Schuylkill River, in this city, has just been commenced. It will supersede the present one, which, as will be remembered, was built to temporarily replace the one burned August, 1877. The bridge will be what is known as the "Pratt and Whipple truss," constructed entirely of iron, save track ties, and will embrace a double track spans of 160 feet each, making a total length of 640 feet, with an elevation from the water to grade of 90 feet. It is what is technically called a "deck bridge," i. e., running on top of the superstructure, not under, and through it is a pin connection, not riveted, and is manufactured entirely of wrought iron except in compressions, such as post feet, &c., cast iron only being used for these. The writer is informed that this bridge is manufactured without a weld. Its strength is equal to two tons to the lineal foot, a total of 1280 tons, while the weight is but 300 tons. Its appearance will be light, aerial and graceful. It is claimed that a pin connection has a vast advantage over the riveted lattice bridge, in that it has more elasticity and will promptly return after depression by train to its original "camber;" that there is more solidity and less oscillation. The great strength and entire security of such structures have been abundantly proven. The bridge is being woven in and through the trestle work of the present one—under it of course—and as the work progresses the latter will be sealed off, trains running on the new as far as built and then taking the old by annexes; thus there will be but little if any delay to trains. The iron will be delivered this week, and is from the works of Clarke, Reeves & Co., the well-known bridge contractors of Phoenixville. The work is in charge of Daniel R. Kelley, superintendent of construction for the above firm, and his energy and the energy of his intelligent and trained band of bridge builders will be evinced by the fact that in from four to six weeks from date a work of this magnitude will be completed.

Our readers will remember the interest that has from time to time been excited in the proposals to pipe oil from the oil regions of Western Pennsylvania to the seaboard, and the failure of all projects thus far. These failures have been occasioned by lack of finances or opposition from the present transporters of petroleum rather than from any belief that the scheme was not feasible. A new line is now projected, not to the seaboard this time, but to Williamsport, on the line of the Reading Road, a distance from Frisbee in the Bradford region, its starting point, of some 104 miles. This will make it by far the longest line. The pipe is to be 6 inches in diameter, and will have a capacity of some 8000 to 12,000 barrels per day. Only three pumping stations will be required to force the oil to the summit of the Allegheny Ridge in Potter county, from which point it will flow to Williamsport by gravity. The entire cost of the enterprise will be \$600,000. All the surveys have been completed, releases of right of way obtained, and work will be commenced at once, so as to complete the line before freezing weather sets in.

The failure of the Tamaqua (Pa.) National Bank is a serious blow to the industries in that section. The suspension was due to the failure of Mr. C. T. Shoener, of Philadelphia, whose investments at Tamaqua were very large. He owned the Tamaqua Rolling Mill, a colliery at Beaver Meadow, a furnace at Reddington, Northampton county, and was a two-thirds owner in Shoener & Allen's machine works in Tamaqua. These will all be more or less affected by the two failures. The bank has been quite prosperous for years, paying 10 per cent. dividends, its stock recently being quoted at 84 on a par of 50.

THE PARIS EXPOSITION.

FRANCE AT HER OWN SHOW.—II.

From our Special Correspondents.)

THE IRON AGE,
B. 3, American Section Exposition Universelle,
PARIS, Oct. 2, 1878.

Continuing the subject of motors we shall notice a few more of the most important ones in the French machine gallery. Messrs. Hall & Windsor have a large vertical compound engine to which they have applied a regulator of their invention, acting directly on the cut-off. This machine is a beam engine of 300-horse power. The beam weighs 10,000 kilograms, and is supported by four cast-iron columns. The fly-wheel, which is 7 meters in diameter, weighs 15,000 kilograms. In the Windsor engines the steam from the boilers enters the cast-iron envelope surrounding the cylinders, and thence passes into the steam chest of the small cylinder. The cut-off is operated by an arm connected with a lever and having a point in contact with a cam. The cam in its rotation causes the lever to describe an arc of a circle, and the length of this arc varies according to the development of the projectors of the cam. The rotation of the cam is produced by gearing connected with the shaft and transmitting motion to the slide valves; and the vertical rectilinear motion of the cam is determined by a piston connected with it by a collar, two vertical rods and a cross-head. The weight of the piston and the piston rod, together with that of the connecting rods, the cross-head, the collar and the cam, tend to lower the cam, thus altering its position relatively to the arm in contact with it. But the envelope of the brass cylinder containing the piston communicates with the condenser, and a certain depression occurs in this envelope. On the other hand the surrounding pressure acts underneath the piston, or the bottom of the cylinder communicates with the depression of the cylinder envelope by means of a constant orifice, while it is submitted to the influence of the pressure underneath the piston by means of variable orifices in the piston. There is, therefore, a certain depression in the upper portion of the cylinder, and the amount of this counter-pressure depends upon the relation between the pressure below the piston and that in the envelope, and also upon the ratio of the areas of the constant orifice and the variable orifices. In order that equilibrium may exist it is necessary that the counter-pressure above the piston be equal to the difference between the pressure below the piston and the weight of the movable system (consisting of piston, cam, rods, &c.). This equilibrium may be obtained by suitably regulating the area of the variable orifices, and when this is effected a constant flow of the fluid takes place throughout the whole apparatus, so that the piston does not move until an alteration is brought about in the orifices. If the alteration occurs in the speed of the engine an ordinary centrifugal governor causes a change in the area of the variable orifices by means of a simple mechanism, into the details of whose description it is needless to enter. The counter-pressure is immediately destroyed in the upper portion of the cylinder, equilibrium no longer exists, and consequently a vertical motion is given to the whole movable system. The shops of Messrs. Hall & Windsor are at Rouen.

M. L. Poillon of Paris has on exhibition some compound engines of peculiar construction, patented by M. Demange. The two cylinders are placed in the same horizontal axis, and are both single acting. The crank shafts, therefore, act in only one direction, by compression, and can be made of cast iron. The cylinders and the surface of contact of the pistons are lined with lead for the purpose of reducing the internal condensation of the steam, the conductivity of lead being three times less than that of cast iron. The reservoir between the two cylinders, and the cylinders themselves, are steam jacketed, and the condensed steam from the jacket is fed to the boilers. Messrs. Buss, Sombart & Co., of Magdeburg, exhibit their "Cosine" governor in the French machine gallery. This governor consists of a spindle provided toward its upper end with a small, flat horizontal plate. A large globular sleeve slides at the top and bottom on the spindle, and consists of two parts fitting into each other and united by means of two screws. The horizontal plate is provided at the bottom with a vertical pin fitting loosely in a borehole of the lower portion of the sleeve and causing the latter to rotate with the spindle. There are two pendulums, each of which consists of an angular lever with a long sleeve. This lever carries a weight and a ball at one extremity. At the other extremity there is an eye through which passes a pin carrying a roller. By means of a steel pin passing through the sleeve of the pendulum, and two eyes on the lower part of the sleeve of the governor, the two pendulums are suspended between those two eyes in such a way that the small roller rests upon the horizontal plate. When the pendulums are caused to rotate about their axis, the weight of the sleeve and the pendulums press the roller against the plate, the axis of the pendulums rises simultaneously with the sleeve, and at the same time the rollers slide on the upper surface of the horizontal plate, and thus serve as friction rollers. The lift of the governor is limited at the bottom by a collar fixed on the spindle, and at the top by the shape of the lower part of the sleeve, which in its highest position will touch the bottom of the horizontal plate. The pendulums are so constructed that for a given angular velocity the centrifugal force is constant for every angle of separation, or the momentum of centrifugal force is proportionate to the cosine of the angle of separation. The Cosine governor with throttle valve combined has a hollow spindle. Through the top part of the sleeve and this hollow spindle passes a thinner spindle which transmits the movements of the governor to the throttle valve. One of the pendulums has in this construction a second eye united with the spindle by means of a short con-

necting rod. As the connecting rod is attached to a lever arm which is three times shorter than the arm that produces the lift of the sleeve, the lift of the rod amounts to only one-third of the lift of the sleeve.

Thiollier and Guéraud build a compact engine of which they exhibit several types. One of these consists of a single cylinder divided into two compartments of different diameters, each containing a piston. These pistons are held apart by a rod passing through a stuffing box, or by two rods passing outside of the small cylinder with a cross-head to which the small piston is connected, thus avoiding the internal stuffing box, which must necessarily be difficult of access. The crank is connected with the large piston. In another type of these engines two cylinders similar to the one just described are coupled. A third type is a marine engine. In this the double cylinders are vertical instead of horizontal, and the distribution is effected by two slide valves working in the same steam chest, which is between the cylinders. A fact worth noticing in the French machine gallery is that a great proportion of the longer engines are provided with the Corliss gear. Now that we have cursorily examined a few of the larger motors in the French section, we shall turn our attention to a subject of considerable and growing importance, that of

DOMESTIC MOTORS.

The introduction of the steam engine has exerted an immense influence on the progress of industry. By its means great economy has been effected in the manufacture of innumerable objects which have thus been placed within the reach of the many. But a reproach which has often been addressed to the steam engine is that while it seems to benefit all it really serves only a few. It is argued that since steam has replaced human muscle as a motive force the manufacturing industries have been centralized to the detriment of the working class and to the benefit of capital. This state of things has impelled inventors to seek a domestic motor by means of which a small amount of power could be economically applied, thus enabling many people to produce, instead of giving capital the monopoly of production. Another advantage of such a motor would be its substitution for that most expensive of all motors, human muscular energy, for numerous purposes to which steam cannot at present be successfully applied. We are indebted for considerable of the data which will be found below to a report on the "Domestic Motors at the Paris Exposition," read by M. Hippolyte Fontaine before the International Congress of Civil Engineers, held at the palace of the Trocadero in the month of July. We shall say but little on the subject of spring motors. There are several of these exhibited in various sections of the Exposition. The details of the mechanism may vary more or less, but the object is always to store up energy in a spring, which energy may afterward be utilized in a different manner from that in which it was stored. For instance, we can store up a great force at a low speed in a short time and transform it into a small force at a high speed which shall last a long time. The principle is an excellent one, but unfortunately the efficiency of springs, *i. e.*, the ratio of the useful work done by them to the total work expended, is very low, and moreover only a very small power can be stored in a spring relatively to its weight. Mr. Fontaine states that even if the best known steel be used and be reduced to the state of watch spring (the most favorable condition for the storing of work) only 40 kilogrammeters can be stored per kilogram of the metal. Under less favorable conditions the work which can be stored without destroying the elasticity of the spring is much less than this. With Bessemer steel in the form of carriage springs the maximum is 12 kilogrammeters per kilogram of metal. Therefore, for continuous work where five or six foot-pounds per second are required, spring motors are not economical, and where less than this power is required a weight is found to be much better than a spring.

There are not many electric motors exhibited. The reason of this is probably that since the discovery that a small amount of mechanical power can be transformed into a great amount of electricity, inventors have concluded that the inverse must likewise be true, *i. e.*, that a great deal of electricity is required to produce a small power. A Gramme machine is exhibited in the French machine gallery, where it runs a small printing press. We also notice two other electromotors. One is constructed on the principle of the Alliance machine, which, if we are not mistaken, was exhibited in 1855 for the first time. The other is exhibited by M. A. Cance of Paris. We shall probably give a description of the latter shortly. M. Cance is now at work upon some improvements in his machine, and he has requested us to delay our description of it until he can furnish us with new data. In experiments made with the Gramme machine M. Fontaine found that with a Bunsen element of 20 m. about one kilogrammeter per second (somewhat over 7 foot-pounds) of work can be generated. He states also that the efficiency of the Gramme machine may be taken at 75 per cent. for a power of 6 kilogrammeters and above, whether work is being transformed into electricity or vice versa. According to the same authority, the total expenditure for a Bunsen element is .10 francs (2 cents) per hour. The cost of obtaining 10 kilogrammeters per second would therefore be 1.33 francs per hour.

A number of small water motors are to be seen in the French gallery. These may be very economically employed in cities where the water supply is abundant and cheap. In Paris, however, where water is dear, it is calculated that with a water motor whose efficiency is 60 per cent., it would cost four francs a day to produce 6 kilogrammeters of work per second during 10 hours. In the Coque motor, which is exhibited by M. Bowdon, the water acts on both sides of the piston of a small vertical engine. The distribution is effected by a slide valve, and the movement of the piston is transmitted to the shaft by a connecting rod and crank. This motor is provided with an air reservoir which diminishes the shocks occasioned by changes of speed, and which absorbs the ex-

cess of work when the speed is at its maximum and restores it when the speed is at a minimum. The Pezzerat motor has an oscillating cylinder, and differs from the preceding in the general arrangement of the parts.

Among the small steam motors we will notice a vertical engine which, with boiler included, measures 30 m. diameter by 80 m. in height. It is heated by gas. The generator consists of a cylindrical shell with a smoke box at about the center of the height of the shell, and copper tubes through which the products of combustion of 24 Bunsen burners pass up into the smoke box and then through a central tube into the chimney. The chimney is connected with the boiler by a horizontal tube, which enables its distance from the boiler to be regulated. The gas passes a regulator at the upper part of the boiler and reaches the burners through a horizontal tube. The regulator has a bent tube directly over the boiler which acts up and down to intercept the passage of the gas. When the apparatus is heated and the steam is at its normal pressure, the passage of the gas is automatically regulated according to the steam expended and to the heat lost by radiation. In other words, the steam is always maintained at a constant pressure whether the engine is running or not, and the pressure can never exceed a certain limit. The regulator thus serves as a safety valve, and has this advantage over the ordinary safety valve, that the latter acts on the effect by allowing the excess of steam to escape, whereas the former acts directly on the cause by preventing the formation of more steam than is required. The apparatus has no feed attachment. It contains water enough to furnish 6 kilogrammeters of work per second during four hours, and every four hours the supply of water has to be renewed. The consumption of gas is 130 liters per kilogrammeter per hour.

We now come to gas motors. Great progress has been made of late years in the construction of these, and several really excellent ones are to be seen at the Exposition. Messrs. Mignon & Rouart, of Paris, exhibit three types of the Bischoff gas motor, of 3, 6 and 25 kilogrammeters respectively. This motor consists of a vertical cylinder cast with radial projecting surfaces representing five times the area of the exterior surface of the cylinder. This radiating surface does away with the necessity of employing water to cool the cylinder. The engine is single acting. The explosion of the gas takes place below the piston and causes the upward stroke, while the atmospheric pressure is utilized for the downward stroke. The explosion is caused by a gas jet, which is kept lighted at the lower end of the cylinder, and which is alternately admitted to the gas and shut out from it by a slide valve. As this jet is often blown out by the force of the explosion, a second vertical jet is kept lighted below it and relights the former every time it goes out. A rubber pouch is fixed to the tube leading the gas into the cylinder, and serves to prevent any irregularity in the pressure from influencing the irregularity of the action of the engine. Between the explosive mixture and the piston there is an air cushion, which is heated and compressed during the explosion, and which immediately after it expands and cools. Neither the piston nor the slide valve is lubricated. It stated that on one occasion one of these motors ran 47 days and 47 nights without stopping and without being touched. The motors of 6 kilogrammeters consume about 330 liters of gas per hour at a normal speed of 100 revolutions, which makes the expense for gas (in Paris) .10 francs (2 cents) per hour. The motor costs 500 francs. The 25-kilogrammeter motor consumes 750 liters of gas at 60 revolutions and costs 900 francs.

The Compagnie Parisienne d'Eclairage et de Chauffage par le Gaz exhibit two different motors, the Lenoir engine, and the Langen and Otto engine. Neither of these is a recent invention, but the machines exhibited comprise all the improvements made on the original patents. The Lenoir engine is horizontal and double acting; the explosion is produced by an electric spark, and the cylinder is kept cool by a jacket of running water. The gas and air are drawn into the cylinder by the action of the piston. The Lenoir engine bears a great resemblance to the ordinary steam engine. The only difference is that it has two slide valves instead of one. Through one of these slide valves a mixture of 90 to 93 of air and 7 to 10 of gas passes to the cylinder. This mixture encounters the electric spark and lights. The heated air expands; a portion of the oxygen of the air combines with the carbon of the gas to form carbonic acid, and another portion with the hydrogen to form water. The second slide valve allows the products of combustion to escape after they have accomplished their work on the piston. The gas is conducted to the engine through a lead pipe, the air entering at the same time through an orifice communicating with the atmosphere. The pressure exerted by the exploding mixture is 5 or 6 atmospheres. As soon as the piston reaches the end of its stroke the products of combustion escape, the fly-wheel carries it over the dead center, the air and gas enter on the other side of the piston, the electric spark is brought to this other side by the slide valve and a similar action is repeated. The cost of the Lenoir engines is for one-half horse-power, 800 francs; for 1-horse-power, 1300 francs; for 2-horse-power, 2000 francs; and for 3-horse-power, 2500 francs.

The same company also construct and have exhibited the Langen and Otto gas engine. This engine was exhibited for the first time at the Paris Exposition of 1867. These are vertical, and the explosion takes place only below the piston, lifting it and causing a rarefaction of the air behind it, enabling the atmospheric pressure to act on the piston on its return. Work is accomplished only on the down stroke. The piston is made up of four segments connected with a rack geared with a toothed wheel, through which passes the shaft to which the fly-wheel and pulley are keyed. The cylinder has a jacket of cold water. As the quantity of water contained by this jacket would not be sufficient to keep the cylinder cool for any length of time, the jacket is connected above and below with a zinc reservoir of the same

height as the cylinder, and as soon as the water in the jacket is heated circulation is produced. Let us now examine the mode of working this engine. The explosion throws the piston to the top of the cylinder; the volume of the hot gases produced by the explosion rapidly diminishes in the cold space in which it is. This contraction forms a partial vacuum below the piston, and the atmospheric pressure combined with the weight of the piston cause the latter to descend to the lower end of the cylinder. During the upward stroke the toothed wheel is loose on the shaft and is rotated by the rack of the piston, but on the downward stroke the toothed wheel becomes fast on the shaft and thus causes it to rotate. The mechanism by means of which the toothed wheel is alternately made fast and loose on the shaft is very simple. Inside of the toothed wheel there is a wheel carrying small metallic cylinders in notches of such a shape that when the toothed wheel revolves in one direction it merely causes the cylinders to rotate about their own axes, whereas when it revolves in the opposite direction the cylinders are wedged between it and the side of the notch, thus producing the connection. We give below the dimensions and prices of the four sizes of these engines, manufactured by the Compagnie Parisienne d'Eclairage et de Chauffage par le Gaz:

	3 h. p.	4 h. p.	1 h. p.	3 h. p.	3 h. p.
Number of revolutions per min.	130	110	100	90	90
Diameter of fly-wheel, meters	0.900	1.340	1.500	1.800	1.800
Net weight, kilograms	370	600	1,070	1,570	1,720
Price, francs	1,500	1,900	2,500	3,300	3,900

The Hugon gas engine, constructed by P. Hugon & Co., of Paris, is horizontal and double acting. An engine of 15 kilogrammeters, the smallest made by this company, occupies a space of 1.70 meters by .70 meter. The expenditure of gas is about 500 liters and the expenditure of water is 100 liters per hour. The price of this motor is 1200 francs. The largest of these engines is a 2-horse-power engine, occupying a space 3.20 meters by 1.50 meters and costing 2800 francs.

Exhibition Notes.

The Paris papers, after having announced that it had been decided to prolong the Exposition until the 20th of November, affirmed last Monday that the Minister of Agriculture and Commerce was opposed to the measure on the ground that the French government has not the right to take this step without the consent of the exhibitors, especially of the foreign exhibitors, who sent their goods here on the understanding that the Exposition would close on the 1st of November. This morning the papers affirm that a compromise has been effected and that the Exposition will close on the 10th of November. The announcement of this decision was expected to have appeared in this morning's *Journal Officiel*, but it did not.

The paying admissions to the Exposition from the opening to October 1st were 9,606,579, making a daily average of 63,376. The admissions in the month of May were 1,270,860; in the month of June, 1,954,103; in the month of July, 1,823,176; in the month of August, 1,969,355, and in the month of September, 2,671,104. The paying admissions for September exceeded those for August, the highest of the previous months, by nearly 700,000.

A great deal of dissatisfaction is felt and expressed by the French exhibitors at the delay there has been in publishing the official announcement of the awards. The *Journal Officiel* is still mute on the subject, and it is probable the lips of the official sheet will remain sealed until after the ceremony of the distribution. It is believed that the sphinx will at last deign to speak on the 21st or 22d inst.

The work of preparing and decorating the Palais de l'Industrie for the ceremony of the 21st of October is being actively pushed forward. The trophies of eight groups of the Exposition will form one of the essential features of the decoration. A wide passage will extend from the center of the Palais de l'Industrie to the stage, and the trophies will be arranged on either side of this passage. The first trophies will be those of Groups 5 and 2, the objects composing them being taken from the group represented. Group 5 (mining industries, raw and manufactured products) will be represented by the trunk of a tree, and Group 2 (education and instruction, apparatus and processes of the liberal arts) by organ reeds surmounted by a geographical sphere. The other six groups will be disposed as follows: Group 6 (apparatus and processes used in the mechanical manufactures) and Group 4 (textile fabrics, clothing and accessories) on the left, and a table with alimentary products representing Group 7 and one loaded with the products included in Group 9 (horticulture) on the right. The last two groups represented will be Group 3 (furniture and accessories) on the left and Group 8 (agriculture) on the right. There will be no trophy for fine arts (Group 1), but there will probably be some statues disposed on either side of the stage.

Distribution of Prizes.

The distribution of prizes, medals and decorations took place on the 21st. The following are the names of those Americans who received decorations, with the different grades of the Legion of Honor to which they were admitted: Richard C. McCormick, Commissioner General, commander; Frederick A. P. Barnard, President of Columbia College, officer; Andrew D. White, President of Cornell University, officer; Prof. William P. Blake, chevalier; Mr. Edward H. Knight, chevalier; William W. Story, chevalier.

A number of exhibitors were also decorated. Of these were: Charles Tiffany, silversmith; Thomas A. Edison, phonograph; Elisha Gray, telephone; Brewster & Co., carriages; J. A. Bridgman, artist. Cyrus H. McCormick, of Chicago, and Walter A. Wood, who were decorated as chevaliers in 1867, were made "officers" upon this occasion. The following, attached to the American Commission, were also made chevaliers: A. H. Girard, Foreign Secretary; Henry Pettit, Architect; Homer Pickering, Superintendent of Machinery; John D. Philbrick, Superintendent of the Educational Section; D. M.

Armstrong, Superintendent of the Art Gallery; Lieut. B. H. Buckingham, Naval Attaché.

History of the Metallurgy of Mercury in Spain.

From Don Luis de la Escosura's work, recently noticed in *The Iron Age*, we take the following on the history of the metallurgy of mercury in Spain, which, until the discoveries of that metal in California, enjoyed a monopoly uncontested for many centuries. It appears that cinnabar, the chief ore of quicksilver, had been worked in Spain as early as the time of Theophrastus, 300 years before the Christian era, and some indications point even to an earlier date. There are reasons to believe that the Moors worked at Almadén (Arab for "the mine") until they were driven out of the district by Alfonso VII. It is not definitely known whether the conquerors continued operations at once, but there are indications that the mine was not left unproductive for any length of time. In 1525 the mine came into the hands of the famous Fugger family of Augsburg, Germany, the Rothschilds of the middle ages. They remained in possession until 1645, when the property reverted to the Crown of Spain, which still works it.

The ancients describe several methods for the working of cinnabar, and we possess records of those of Theophrastus, Dioscorides and Plinius. From the eighth to the twelfth century the Arabs worked the ores in furnaces called *Xabeas*. They were square with an arched top, a fire-place at one end and a chimney at the other. Several rows of pot-shaped vessels covered with a lid and filled with ore were put into them and heated for 12 hours, after which the furnace was left to cool off for the rest of the day. The consumption of fuel was enormous, being about 1500 lbs. to 50 lbs. of quicksilver. The use of *Xabeas* was continued till the beginning of the seventeenth century, when the Germans introduced so-called reverberatory furnaces, of which, however, no description is to be found, although the works possessed as many as 24 of them. Escosura, however, succeeded in finding a description of furnaces, probably similar to those of Almadén, in a work published in Lima in 1617 by Monsalve, describing the apparatus used at Guanacaveca in Peru. The reverberatory furnaces were displaced in Almadén by the invention of the Aludel, or Bustamente, furnace, by Lope Saavedra Barba in 1633 at Guanacaveca, and introduced in Spain by Juan Alfonso de Bustamente. The latter seems to have been an energetic and enterprising man who rapidly, in the face of the usual court intrigues, with the aid of his associate Diego de Sotomayor, removed the old reverberatories in 1646 and replaced them by the furnace now still, though unjustly, bearing his name. The Bustamente furnace remained until 1806, when two Idria furnaces, first constructed in Austria toward the end of the last century, were put up, although they did not displace the old type, which is still in use till this day. It is true, however, that their use cannot be justified much longer, and that they must ultimately yield to the better constructions of modern metallurgy.

Labor Notes.—The coal miners at La Salle, Illinois, have voted to dissolve the union which has so long interfered with the relation between the mine owners and the employees in that region. A mass meeting of miners was held on Thursday of last week at Brown's coal works, on the Youghiogheny River, to endeavor to induce men working under the price established by the late convention in Pittsburgh to come out. The meeting was largely attended and well conducted. They adjourned after passing resolutions and appointing committees. The miners of Coal Valley, Pa., are still out on a strike against a reduction to two cents for mining coal. The glassblowers at the Bellaire, O., Glass-works have struck again. This time the trouble was caused by the discharge of three cutters who had demanded an increase of wages.

Glass Items.—It is now reported that the Iron City Glass Works, located at Fayette City, Pa., will be got ready and started at once. Messrs. Nightman & Co., South Side, Pittsburgh, made their first blowing at the Temperanceville works last Saturday. The glass works at Bellaire, Ohio, let out their fire on the 12th inst., after making three blowings.

Praise from an English Paper.—One of the principal reasons for the success of American manufactures abroad is the adaptability of American mechanics. They are not only competent to make anything that is required, but they can also design tools for any conceivable purpose. They can make machinery for any work whatever, and they are always ready to learn. They do not think that theirs is the only way in which a thing can be done, and they are ready at any time to make any sort of tools or machines that their customers call for. It is the versatility of American mechanics that pushes their products on the foreign market.

On Saturday week, at Columbus, Ohio, a new certificate of incorporation was taken out. The Ashtabula and Pittsburgh Railway Co. was reorganized with a capital of \$1,700,000. This railway extends from Youngstown to Ashtabula via Girard, Niles and Warren. The new company are the successors of the Ashtabula, Youngstown and Pittsburgh Railroad Co. that owned the line of road as above, extending from Youngstown to Lake Erie. The road was sold under judicial proceedings, and the company are now reorganized as above, with Warren Packard, H. L. Morrison, A. C. Fisk, J. J. Brooks, C. B. Wick, Wm. S. Bissell, F. Harrington, Wm. Thaw, W. P. Shinn, Wm. Mullens, Thomas D. Messler and George B. Roberts as directors. The road is controlled, as heretofore, in the interest of the Pennsylvania Central.

Great industrial stagnation is reported in some parts of Italy, and the Genoa factories are discharging a large proportion of their help.

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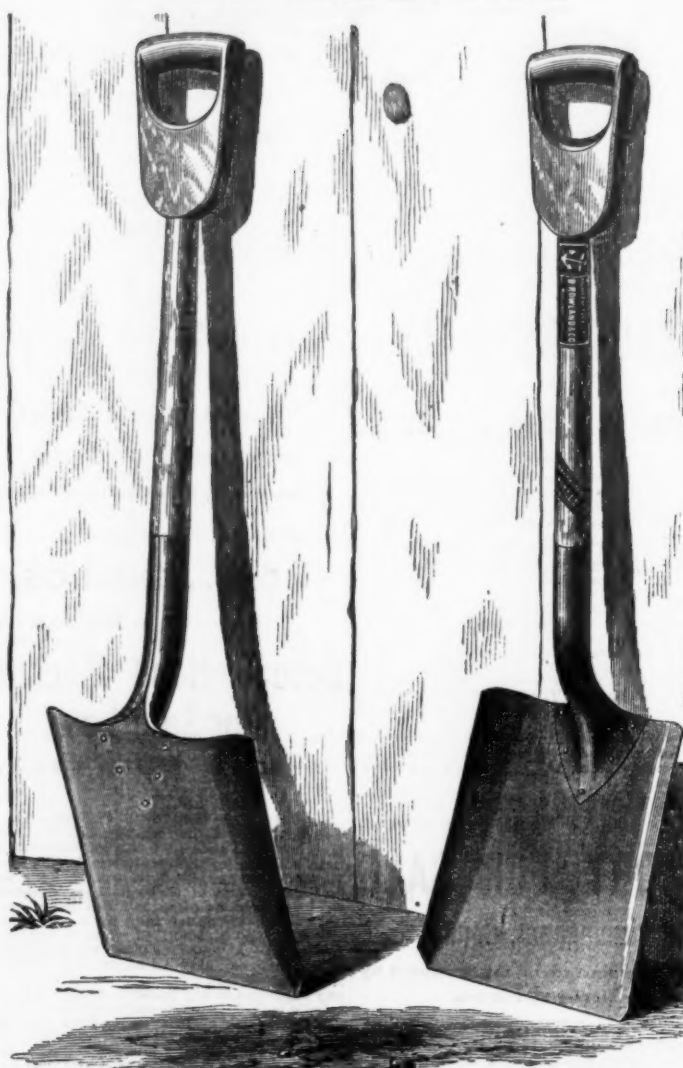
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Possible Economies in Charcoal Manufacture.*

BY JOHN BIRKINBINE.

The favor with which the members of the Institute received Mr. Fernow's paper upon the use of charcoal rous in the manufacture of iron, has encouraged me to present this paper, in the hope of having the discussion upon the manufacture and use of the oldest, and undoubtedly the best, fuel for producing pig iron continued.

Owing to the advances made in employing anthracite coal, bituminous coal or coke, or mixtures of them, we are apt to forget how much of our present development is due to the pioneers in iron manufacture and the fuel which they employed in the production of pig iron. In Mr. Swank's last compilation of the iron and steel works of the United States, the furnace capacity of the country is given as 5,848,000 tons, of which 1,000,000 tons can be made in the 272 charcoal furnaces. In other words, over one-third of the furnaces now in existence use charcoal for fuel and produce more than one-sixth of the iron made. If to this is added the 130,000 tons of blooms and billets turned out of the 122 forges and bloomeries, the importance of the charcoal industries will be appreciated.

In making the comparison of the operation of various charcoal furnaces, the writer has found difficulty in arriving at proper conclusions owing to the variety of bushels in use. They have been found to be rated in capacity from about 2500 to 2700 cubic inches, and in weight from 18 to 22.5 pounds. Two furnaces in one neighborhood have been noted whose standards respectively were the two extremes of weight mentioned, although the timber used was of the same varieties and proportions. It has therefore been necessary to reduce the fuel consumed per ton of iron to cords of wood, as a cord seems to represent a fixed quantity in all districts (except so far as the ingenuity displayed in piling by some wood choppers affect its interstitial spaces).

An allowance of 4 cords of wood per ton of pig iron produced is probably too low for a general estimate, but taken upon that basis the charcoal blast furnaces of the United States have a capacity for consuming annually 4,000,000 cords, and fully 400,000 more are employed in the forges and bloomeries. Making allowance for fires, the average growth of timber convenient to the iron works will not exceed 1 cord per acre per annum. Therefore, to supply these furnaces, forges and bloomeries will necessitate the denudation each year of 147,000 acres, or 230 square miles, of 30-year timber. And yet this large quantity represents but a fraction of the woodland which yearly falls before the ax.

It is not the purpose of this paper to discuss the climatic effects of this extensive clearing of lands, nor to consider its influence upon the water powers of the country, for this more properly belongs to the sadly neglected specialty of forestry, a study which may well be embraced by all metallurgists using charcoal for fuel.

Although we are credited with being in the steel age, charcoal iron is not a manufacture of the past, nor is it likely to be in the very near future, and a discussion which will lead to more economical production of this fuel will be of value to many metallurgical industries.

Probably more than 80 per cent. of all the charcoal consumed in this country is produced in heaps or mellers, in the same manner that our grandfathers manufactured it. The mere fact of following in a path beaten by our ancestors is no condemnation of a process; but it is well known that in this case the means employed give but a small percentage of possible product. Kilns have been employed at a number of furnaces, but although the yield has been increased the additional expense of hauling wood in place of charcoal has been offset against their advantageous employment. Retorts have been used to a limited extent, but have been subject to similar objections, and except where water communication can be had they are the exception rather than the rule.

A general impression exists among furnacemen and foremen that charcoal made in any other way than in mellers is of inferior quality. There seems to be no good reason for this, for the carbonization in retorts and in moderate-sized kilns should be under even better control than in the mellers. One cause of inferiority in charcoal made in retorts may arise from the possibility of carbonizing rapidly, for the valuable research of Karsten and Violette, although controverted by Dromart, leave the balance of proof in favor of slow charring, both for quantity and quality of product.

It is probable, too, that Violette's comparative experiments upon charring wood under pressure and not under pressure have not encouraged the employment of closed vessels, but the results are not fair indices, for the experiments were made in hermetically sealed tubes, the pressure in which was at times sufficient to cause their rupture, while in practice retorts would work under but slight pressure.

The assertion made by Percy that "charring in retorts heated externally is not specially within the province of the metallurgist," which precedes his elaborate description of all other methods of carbonizing wood, may, on account of the standard of authority, have discouraged experiments in the use of closed vessels.

By properly regulating the heat applied to a retort the carbonization of the wood it contains should be either rapid or slow, as is desired, to give the best results as to product; and as so much of the wood in a meller is consumed in carbonizing the rest that the ordinary yield of charcoal is less than 20 per cent. of the weight of the wood in the heap, and as this percentage of yield can be doubled in retorts and the otherwise waste by-products utilized, it would seem that the employment of closed vessels would be the process of the future.

*Read before the American Institute of Mining Engineers at the October meeting.
†The records of 50 charcoal furnaces show an average consumption of 1.38 bushels per ton of pig iron, and a yield of 35 bushels per cord of wood would represent the consumption of 4 cords of wood per ton of pig iron.

The varying success heretofore attending the use of retorts at iron works may influence their employment in different localities according to the results attained. That the quality of charcoal made and the rate of carbonization will be under more complete control when a small amount of wood is treated in a closed vessel than will a larger quantity if prepared in an open pile, may be fairly admitted. One objection to the use of retorts, and a very strong one, is the expense of constructing and maintaining the necessary plant; but it would seem that the products of distillation would surely more than compensate for the interest on the investment and deterioration of the plant. The number of acetates used in commerce and the large quantities of them employed in our varied industries, would encourage faith in the continuance of a good market for any material manufactured from the distillation of wood, and the increased yield from the same average would augment the value of timber lands available for charcoal production.

The crude pyroigneous acid is one of the best preservative agents, and is largely employed in preserving meats, vegetables, timber, &c. The wood spirit is utilized in fixing colors, dissolving varnish, &c. The various acetates are largely employed in calico printing, dyeing and the manufacture of dyes and colors, and they all are also more or less disinfectants.

The local demand for the various acetates or the production of certain metals convenient to the charcoal industry, may influence the character of the product. Thus it would appear that the Missouri charcoal furnaces might be able to cheaply manufacture sugar of lead, and that in the Lake Superior copper region verdigris or Paris green might be economically produced.

Being desirous of obtaining information concerning the possible yield of products, inquiries have been made of various parties conversant with the subject with a view of determining the yield and commercial value of the various acetates.

The following data were furnished by M. Antoine Mathieu, a French chemist and expert in wood distillation, and are given on his authority. One cord oak wood will yield in retorts 70 bushels charcoal of 2561 cubic inches, and 225 gallons of pyroigneous acid; also 1/2 to 3/4 gallon wood spirits and 25 to 30 gallons of tar. The present prices in Philadelphia are about as follows: Pyroigneous acid, 2 3/4 cents per gallon; wood spirits, \$1.25 per gallon; tar, 8 cents per gallon.

The pyroigneous acid can by a simple process be transformed into acetate of iron by using about 40 pounds of iron filings, chippings or detinned scrap; the acid from one cord of wood will yield about 220 gallons of acetate of iron, the present market value of which is 11 cents. Or by heating 40 pounds of quick-lime with the pyroigneous acid from one cord of wood, 200 pounds of acetate of lime can be obtained, the commercial value of which at present is 4 cents per pound. Or the resulting pyroigneous acid from one cord of wood may be made into 350 pounds of acetic acid, worth at present 5 cents per pound.

By submitting 175 pounds of lead made into litharge to the action of the pyroigneous acid from one cord of wood, after it had passed through one distillation, 300 pounds of brown sugar of lead can be obtained, the quotations of which are at present 7 and 7 1/2 cents per pound. If a portion of this crude acetate of lead be refined, a product of white sugar of lead valued at 19 cents per pound is obtained; or, by similar action upon 80 pounds of copper, 200 pounds of acetate of copper can be produced worth, at this time, 27 cents per pound. Another valuable commercial product is the acetate of alumina, which can be produced from brown sugar of lead, acetate of lime and alum, or with acetic acid and clay. Wood vinegar can also be produced. The above quantities and prices will permit of considerable reduction and yet show that a large amount may be expended in producing some of the above products.

With the exception of Marcus Bull's monograph, read before the American Philosophical Society in 1829, most of the data we possess in reference to the yield of different woods, their calorific powers, &c., are gleaned from foreign publications, mainly French, German and Swedish, and the writer is not aware of any comparative experiments in the manufacture of charcoal in round mellers, rectangular piles, kilns, retorts, &c., made in this country. Out of 100 parts of wood placed in a meller, say 20 parts are made into charcoal, 50 parts are burned to carbonize the 20 parts or are carried away as acetic vapors, and 30 per cent. is hygroscopic water and uncondensable gases.

With such a waste, amounting to 50 per cent. of the wood, surely the subject of increasing the yield of charcoal and collecting the products of distillation is worthy of attention. Is not the item of hauling the wood unnecessarily highly estimated? The problem is generally stated thus: If wood is coaled in mellers in the woods the charcoal only is hauled, but if the wood is hauled to the kilns or retorts at the furnace, five times the weight must be handled. This does not make any allowance for increase of yield in the latter methods. If retorts double the yield the item of hauling would be as 2 1/2 to 1 and not 5 to 1. But why should not the retorts be used in the woods? There are numerous steam saw mills throughout the country which are being constantly moved from place to place, and it is found to be economical work if but a few acres are to be cut.

With the conveniences of special shapes in wrought iron a semi-portable arrangement of retorts could be made, and it is probable that it would need to be moved but once a year. There are many tracts of woodland where such an apparatus could be set convenient to a stream and the wood from 100 acres brought to it by sledges, with a maximum haul of less than 1500 feet, and the charcoal delivered to the furnace or forge in wagons or shipped in bags on cars. It is hardly fair to assume that charcoal cannot be transported by rail economically when it requires less of it than of coke to make a ton of pig iron, while the latter is carried hundreds of miles.

The use of retorts for carbonizing wood is not new to us, and the records of success

and failures incline to a majority for the latter. Yet from these failures will surely be developed a practical economical method of carbonizing wood and utilizing the raw waste products. Although full information in reference to the results attained is not at hand, I am led to the belief that failures may be attributed to the following causes:

1. Deterioration of product, either by too rapid charring or by unequal charring, owing to the arrangement of applying the heat, or to the fact of operating the retorts so as to give best results in by-products to the sacrifice of the charcoal.

2. Operating an apparatus whose success depends upon chemical combinations without a knowledge of chemistry.

3. Constructing the apparatus rather to save money in the plant, than to reduce the expense of manufacture.

It surely does not appear too much to expect that the problem of making good charcoal upon an economical basis for metallurgical purposes and utilizing the valuable by-products may be demonstrated.

The immense waste by the present process seems the more inexcusable when it is remembered that wood is carried at large expense to our cities, there to be subjected to destructive distillation at chemical works or textile fabric manufacturing for the purpose of utilizing the acetic vapors. These notes have been made with reference to the production of black charcoal as generally used, without considering the economy of using semi-charred or kiln-dried wood.

Siemens-Martin Steel in the West.

One of the most notable indications of the tendency of the developments in iron manufacture (using iron in its broadest sense) is seen in the present activity in the West in building furnaces for the production of steel by the Siemens-Martin process. When Mr. I. Lowthian Bell made his first visit to this country late in 1872, so little had been done in the manufacture of Siemens-Martin steel that he remarked: "I believe little or no steel was being made in the United States by taking advantage of the intense temperature within the command of the Siemens furnace." Mr. Bell was right in saying "little," as in 1872 but 3000 tons were made, which in 1873 had increased only to 3500 tons. At that time there was but one Siemens-Martin furnace in operation west of the Allegheny Mountains—a 7-ton one at Singer, Nimick & Co.'s, at Pittsburgh. The very complete plant at the Otis Works, Cleveland, was building, but did not go into operation until 1875. Since the time of Mr. Bell's visit the Cleveland Rolling Mill Co. have built three 7-ton furnaces, and Bolton, Myers & Co., Canton, Ohio, a 6-ton furnace, making altogether at the beginning of this year six 7-ton furnaces and one 6-ton furnace working west of the Allegheny Mountains, not including the one at the Blair Iron and Steel Works, Pittsburgh. Since the beginning of this year, however, there has been a growing conviction in favor of this process and an activity in building furnaces that is remarkable. No less than eight furnaces are in process of erection in Western Pennsylvania, Ohio and Illinois, viz.: Two 10-ton (Pernot) at Johnstown, one 7-ton at the works of Hussey, Howe & Co., one 10-ton at Anderson & Passavant's, all in Pittsburgh, and one 10-ton at a mill at present making only iron. One 7-ton furnace is building at the Burgess Works, Portsmouth, Ohio, and two 10-ton furnaces at Springfield, Ill. When these furnaces are completed the annual capacity of the United States will be fully 160,000 tons. This activity is the counterpart of what has been going on in England for several years past. At the date of the latest figures we have (January 1, 1878) there were 90 open-hearth furnaces in Great Britain with a capacity of 250,000 tons per annum, although the make for 1877 was only 137,000 tons, nearly double the amount made in 1873—77,500 tons. For many purposes open-hearth steel is largely supplanting crucible steel, which is still melted in England in the old-fashioned coke holes at a very large expenditure of fuel, and that, too, in a country where fuel is very costly. The cheaper method of the Siemens pot furnace has not been introduced to any great extent, no more than 3900 tons having been melted in this way in 1877. As Mr. Jeans, the able secretary of the British Iron Trade Association, remarks, speaking of the use of the Siemens furnace in the manufacture of steel: "While America is thus a long way behind Great Britain in the production of open-hearth steel, she is a long way before us in regard to the manufacture of crucible steel." For some reason English steel manufacturers are firmly set against using this furnace in the manufacture of crucible steel. There are many grades of steel, however, the extended use of which in England was dependent upon a reduced cost, especially of consumption of fuel, and as these grades could be made by the Siemens-Martin process the result is that the product of the latter is not only replacing crucible steel for many purposes, but is also, by reason of the slight difference in cost, taking the place of iron.

This latter feature is doubtless the cause of the greater favor it is finding in this country. As we use Siemens furnaces almost entirely in the manufacture of crucible steel at an expenditure for fuel that is a mere nothing, reduced cost in this line is not so much an item with us as it is in England, and, therefore, the product of the open-hearth furnace is not as largely displacing crucible steel as in England. It is true that it is doing it to some extent, but it is the demand for open-hearth steel as a substitute for iron that in this country has led to the development of its manufacture. It is being used for plates, rails, axles, tires, wire, &c. The fact that the Bessemer patent is so controlled that new mills cannot be started, has led to the adoption of this process even for rail making; for instance, at the Roane Iron Works and at Springfield, although it is probable that these works would not have adopted it could they have obtained rights under the Bessemer patents. A very considerable portion of the open-hearth product goes to manufacturers of wire. The amount used in this way is something marvellous, and though we have no data to show how large it is, we have reasons to assert that it amounts to tens of thousands of tons

per annum. A large amount of shovel plate is now made of open-hearth steel, and for springs it is taking the place of German and crucible steel.

The product of the Siemens-Martin process is of a very uniform quality and can be made at quite as low a price as that manufactured by the Bessemer process. We have no figures of cost for this country, but calculations made last year in Scotland show that ingots can be produced by the open-hearth process at £6. 13/8 per ton exclusive of royalty.

Railway Mismanagement.

A blighting influence rests upon the railway interests of the United States which discourages the hope of speedy recovery unless this management is reformed. Among several gentlemen who were heard a day or two ago to express themselves on this subject is Mr. C. T. M. Davis, for more than thirty years past connected with important iron works and car-building establishments. He remarks that there was never a more favorable time than the present for the construction of railroads, some of which are urgently needed. This is so, not only on account of the cheapness of labor and materials, but the abundance of idle capital. Despite these facts depression is everywhere apparent. The one great and almost insurmountable difficulty that new enterprises have to contend with is the entire lack of confidence in everything pertaining to railway affairs. As we hear it expressed, Wall street has cried "dead fish" so long that at last capitalists really believe that nothing connected with railroads has any substantial value. It cannot be denied that from a variety of causes there has been a disastrous breaking down of railroad securities, but this does not affect railroad property at all, as an investment, when properly managed. Our informant repeats with emphasis that the greatest difficulty in convincing capitalists is that railroad managers are constantly depreciating their own property for speculative purposes, of which a signal illustration is afforded in the recent history of the Milwaukee and St. Paul road, where millions of dollars were lost through speculative enterprises, in which the directors were engaged, by "selling short." Declaring that the stock was not worth anything, they watched eagerly for the lowest point of depreciation, so that they could buy in. In other words, they would sell short, and when prices were knocked down to suit they would "cover the shorts" and make the difference. A return to prosperity cannot be expected while such things are of daily occurrence. As long as we see railway directors in the market selling what does not belong to them, confidence cannot stand. Capitalists, when shown the sure advantages promised in a proposed new enterprise, are never sure that when the road is finished the promoters will not turn round and wreck the entire property for the sake of the plunder. Watering, it is needless to remark, is another way of producing the same result. We repeat, the bad faith of railway managers stands more in the way of legitimate railway enterprise than anything else that can be named.

Looking at the railway system of the country as a whole, our best informed and most observing men regard the recent improvement as substantial, arising from closer management and economy. Roads are operated at less cost per mile than before within the last 10 years. An evidence of prosperity is the extraordinary activity in the great car works at Troy and Albany, the two largest in the country, which are filled with passenger car work, as much as they can do until January. Contracts include work for the elevated railways, the Boston and Hoosac Tunnel road, &c. Again, all the works engaged in the manufacture of Bessemer steel rails have contracts far into next year and are making splendid profits. All the mills have been full for months past, and prospects for the coming year, so it is affirmed, are just as good as for the last. Many mills, in fact, are rather loth to enter into contracts at present prices. But of course railroads cannot be built during the winter, which must be considered by manufacturers in any business now offering.

In conclusion, no schemes for investment can be successful unless confidence is restored, unless there is reformation in railroad management, now utterly demoralized. Every railway experience, in a greater or less degree, the paralysis thus arising. Scarcely one is exempt from the pernicious practices to which we have referred, and the fact that capitalists know this to be so explains their reluctance to aid old or new railroad enterprises.

The British government is going to establish a mint at Hong Kong, at the expense of \$250,000, for the purpose of coining a piece of English money to supplant the trade dollar, which is a universal medium of exchange in the Chinese empire. It has driven the old favorite, the Mexican dollar, out of circulation.

The Nevada Bank has sold the government 1,000,000 ounces of silver on private terms. The best offer to the Secretary of the Treasury, the *Bulletin of San Francisco* says, is \$1.11, and some parties decline to sell at that figure.

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COAL.

The market at the present time is firm. The increase of tonnage for the present month has in no way affected prices, which remain firm. We think that circular quotations are quite generally realized. Stocks of Coal at the shipping points are nearly or quite exhausted, and considerable delays in the shipments of Coal are reported. Freight rates are firm, but there seems to have been no advance whatever since last week. Vessels are reported scarce, and it would not be improbable if a greater scarcity was felt within a short time, as a large number of colliers were wrecked in one of the recent gales. The question of the combination seems to be at rest, although it will probably come up in a new form at the beginning of the year. The Lehigh men are firm in their resolves to have line trade excluded from the basis of tonnage for the next year. If this is done they will be easy and will not have to curtail their outside shipments for the sake of the furnaces along their line. Taken altogether the Coal trade for the past week has been very satisfactory.

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., Philadelphia, Oct. 22, 1878.

Last week we gave a brief summary of the condition of business among the heavy consumers of Iron. Since that time we have given attention to the manufacturers of Hardware specialties, and have been agreeably surprised to find business in a most satisfactory condition, with the one exception of universal complaints of low prices. At Henry Diston & Sons' the Saw trade is reported something better than last year. In the Southwest, owing to the yellow fever, they report a considerable falling off, more than balanced, however, by important improvement in the West and Northwest; steady growth is also reported in their foreign trade. In long saws the increased demand is very noticeable. During three months last fall they had orders for 17,000 of these saws. The first corresponding month of this year they have sold 700 dozens, about equal to a month and a half sales last year, with the yellow fever districts yet to hear from. At the works of Henry Diston & Sons (Limited) the increase in business has been steady and rapid from the first, with every indication of continued growth. This does not appear in any degree to have affected their neighbors, who are extending in similar proportions. At the Black Diamond File Works (G. & H. Barnett) they have had a steady business all the year, and latterly have been pushed to their utmost to meet the demand. McCaffrey & Bro. have been equally well situated, and for weeks past have been crowded with orders. We are pleased to learn that they have just received from Spain, accompanied with cash remittance, a considerable order for files, the result of their exhibit at Paris. At the Enterprise Mfg. Co. their new building has been found none too large for their increasing business. Something over 300 hands are now on their pay roll, and for several weeks they have been at work up to 10 p. m. in order to meet the demand for their specialties. The American Machine Company have had an excellent business during the season in which their specialties are in demand, but at present, as usual toward the close of the year, their business is less active. Agricultural tools, Shovels, Forks, Hoes, &c., have also been in good demand. B. Rowland & Co. report a steadily increasing trade from the home and, to some extent, from foreign buyers. It is especially noticeable that the best goods are growing in favor, the increase being chiefly in this class of tools. In the Lock trade business is active and increasing. The D. K. Miller Lock Company are about moving into larger premises, so as to meet the growing demand for their combination locks, at least one-half of which are sold for export. We noticed an order to them the other day for 2000 combination locks to go to the Pacific coast. The Star Lock Works are also working up to their full capacity on both home and foreign orders. The Philadelphia Screw Co. are also working overtime to meet the demand for their goods, and if prices were a little better they would regard business as entirely satisfactory. Hardware jobbers, however, report business light and unsatisfactory the year through, having been quite below what was expected. There is a cheerful feeling, however, and if the yellow fever soon abates it is hoped that a portion of the decrease may yet be made up before the close of the year.

Pig Iron.—Business during the week has been less active than during the early part of the month, but sales made some time ago keep the furnaces full of stock, and there is little probability of accumulation during the next month or six weeks. The condition of the market after that will depend upon the outlook in business and the degree of confidence felt in values generally. There are encouraging features and the reverse. The best-informed men in the trade have no anticipation of improvement until toward spring. Confidence is too much unsettled to warrant such expectations. The developments of financial disasters across the water and sinister rumors in regard to large corporations on this side, are in the mean time effectual barriers against immediate improvement. The condition of the trade is felt to be so absolutely strong, however, that the worst that can happen can only be of temporary duration, and if some tottering concerns have to succumb it will be the better for the trade generally. The winter months will probably bring matters to a crisis. Firms who are in a sound condition have nothing to fear; those which are not will be better out of the way. This feeling has become very general of late, not because any one desires injury to his neighbors, but because the chief obstacle in the way of permanent improvement is met with in the competition of weak and insolvent concerns. Prices are unchanged and fairly steady at former quotations. The demand for Old Rails attracts attention, and as prices

have advanced about 10 per cent. without bringing out many it is not unlikely that if the demand continues the effect will soon be seen in the market for pig metal. The Reading Iron Company will put one of their furnaces in blast immediately, and a second one at an early date. They have a large amount of work on hand at their various establishments, and as far as possible they propose utilizing their own facilities. Their mill, known as the Reading Sheet Mill, which has been closed for some years, will also be put into immediate operation, and the product used in the manufacture of tubes, pipes, &c. This may be considered substantial evidence of improvement. We have also just learned from Mr. Jas. M. Swank that the Michigan Iron Company have sold the balance of stock amounting to 1500 tons of Charcoal Iron to the South Bend Iron Works, Ind. This has been carried by them since 1874. We may also mention that some pretty heavy purchases of first-class brands of Iron have been made by Philadelphia manufacturers, the chief object being to secure quality, as very cheap Irons, as regards price, have proved very expensive in actual working. From the above it will be seen that while there is no positive improvement realized in prices as yet, and no immediate prospect of any, there are substantial evidences of returning confidence, which it is expected will ultimately develop into something like old-time prosperity. We quote: Select No. 1 Foundry Iron, \$18 @ \$19, ordinary Lehigh brands; No. 1 Foundry, \$17 @ \$18; No. 2 Foundry, \$16 @ \$16.50; Gray Forge, \$15 @ \$16; White and Mottled, \$14.

Blooms.—The tone of the market does not improve and quoted prices can only be obtained for small lots; large transactions are subject to special arrangement. Nominal rates are as before, viz., Sunken Scrap Blooms (2464 lb), \$38 @ \$39; Northern Ore Blooms (2240 lb), \$33 @ \$37; best quality Charcoal Billets (2240 lb), for wire and steel purposes, \$58 @ \$60; Bars do., \$62.50 @ \$65; Sheet Iron Blooms, cornered (2464 lb), \$53 @ \$55; Cold-blast Charcoal Plate Blooms, \$50 @ \$53; run-out Anthracite, \$45 @ \$47.50.

Muck Bar.—There does not appear to be much demand, and prices are somewhat irregular. We hear of a considerable quantity likely to be placed on the market, and one of the leading brokers is prepared to negotiate for any sized lot up to 2000 tons, providing fair prices can be obtained. We quote \$30 to \$33, Philadelphia delivery, according to quality.

Structural Iron.—There is nothing new of any importance, and sales have been chiefly confined to small lots. The mills are all busy, however, and there is no apprehension of any scarcity of business, as there is not only a large amount of work to finish on former contracts, but prospects of new business at an early date are very encouraging. Current business for small lots very fair. Prices are steady and unchanged, as follows: Angles, 2.25 @ 2.45; Tees, 2.45 @ 2.55; Beams and Channels, 2.75 @ 2.85.

Plate and Tank Iron.—The market during the week has been very quiet, and no transactions of importance have been reported. Manufacturers are generally pretty well supplied with orders, although in some instances we find more eagerness to secure fresh orders, so that the mills may be kept fully employed. The new orders for Ship Plate will fill up to some extent, and the order (referred to in our last) for some 5000 tons of Skelp, which seems to be a settled fact, will fill up in other directions, leaving little room for competition for current business. Prices are steady and unchanged, as follows: Common Plates, 2.25 @ 2.35; Tank Iron, 2.35 @ 2.55; C. No. 1, 2.45 @ 2.65; Shell Iron, 2.75 @ 2.95; Flange Iron, 3.75 @ 4.50; Solid Firebox, 4.85 @ 5.50; and Best Bloom, 5.50 @ 6.50.

Sheet Iron.—The demand continues as active as noted in our late reports, and a large business is reported in all descriptions. Prices are unchanged and somewhat irregular, but on the whole the market may be called steady and firm. Under ordinary circumstances higher prices might be expected, but sellers are perfectly willing to meet the demand, and with some to unload the large stocks carried over from last season appears to be the chief aim, while others are in a measure compelled to conform to prices accepted by their neighbors. However, there is no doubt the condition of the Sheet-Iron trade is improving, and better prices may be expected soon as stocks are brought into reasonable dimensions. We quote: Common Sheet, No. 20 to 23, 2.85 @ 2.95; No. 24 to 26, 2.95 @ 3.15; No. 27 to 28, 3.15 @ 3.35; Best Refined Sheet, No. 25 to 28, 3.25 @ 3.35; No. 22 to 24, 3.15 @ 3.25; No. 26 to 21, 3.05 @ 3.15; Best Bloom Sheets, No. 25 to 28, 5.15 @ 5.25; No. 22 to 24, 5.15 @ 5.25; No. 16 to 21, 4.75 @ 4.85; Refined Plates or Blue Annealed, 5.15 to 16, 2.35 @ 2.45; American, E. G., 5.15 to 16, 2.95 @ 3.05; Best Bloom, 5.15 to 16, 4.85 @ 4.95; Philadelphia Russia, 6.50; A Patent Flashed, 10.50; B Patent Flashed, 9.50; Best Bloom Galvanized, 45% discount; second quality, 55%; extra discounts for large lots.

Bar Iron.—The dullness noted in our last report seems to continue, and the business of last week has been quite a disappointment. Two or three weeks ago a better feeling seemed to prevail, and anticipations of gradual improvement were pretty general. The slight activity then noted appears to have been a little spurt, based on the car orders and the usual extra demand following the summer dullness. During the last two weeks, the market has been as dull as ever, with nothing in sight to warrant more favorable predictions. We have been notified that work will be resumed to-morrow or during the week at the mills of James Rowland & Co., S. Robbins & Son and Hughes & Patterson, the reduction having been accepted by all the employees. It would be premature to state what effect this will have on the market, as nothing has been agreed upon in regard to prices. At first sight lower prices might be expected in view of the reduced cost of labor. The reduction was claimed so that manufacturers could sell their products with some little margin for profit. Previous to the strike it was understood that this could not be done; besides, the rate of 2¢ base was entirely

nominal, and very little business was obtained at that figure. We infer, therefore, that some plan will be agreed upon by which a uniform scale of prices will be adopted to secure a fair amount of local business to the city mills. The resumption ought not to affect the market unfavorably, as they have since the suspension been selling regularly from stock, and will not now be under any necessity of looking for a market outside of their regular trade. We quote from 1.75 to 1.95, according to quantity and quality.

Steel Rails.—There is nothing new to be said, but previous reports as to firmness and activity may be again confirmed. Some good-sized orders have been placed, one being for 6000 tons for Western delivery, another of 1000 tons for the South and a number of smaller lots, all at about medium quotations. There are numerous inquiries, and there is no doubt some large orders will be entered during the next sixty days. At a low estimate 50,000 tons will be closed during that time, and quite likely a much larger quantity. Prices are not likely to vary much from present quotations, although the high figures paid in recent cases where prompt delivery was required, will probably not be repeated. Buyers' views appear to be \$41 @ \$43, according to location of mill, section of rail, &c.; in the meantime \$42 @ \$45 more nearly represents recent transactions.

Iron Rails.—The market continues firm, and the sales effected during the past week have all been at full prices. The demand for light sections continues good, and inquiries for other descriptions have been quite active also. We note sales of 1000 tons 35 lbs. for Western delivery at \$35 at mill, with light sections at from \$36 to \$38. We quote the extreme range as being \$32 @ \$38, according to quality, section of rail, location of mill and terms of settlement. Market very firm.

Old Rails.—We cannot learn of a single sale since date of our last report. Buyers are on hand for large or small lots at anything like reasonable prices, but none are offered for immediate delivery. There is some difference of opinion as to the exact position of the market, but the impression is gaining ground that plenty of Old Rails may be had if prices are worked up to suit holders' views. That stocks have been reduced considerably is beyond question, and at the prices ruling. Some time ago they were the cheapest article in the market, but at an advance of a couple of dollars per ton or more, as regards Pig Iron the position is different. On good authority we are informed that 40,000 to 50,000 tons of Old Rails are held by strong Eastern railway companies, and that they will be forthcoming in lots to suit the market, as soon as the extreme figure which buyers will pay has been ascertained. Stocks are in strong hands, however, and it is not likely that very low prices will prevail again for some time to come. Buyers offer \$19.50 @ \$20, Philadelphia delivery, for fair average quality. Offerings none.

Spikes.—5 1/2 x 9-16, 2¢; 1/2 x 4 and longer, 2.35; 7-16 x 4 and longer, 2.45; 3/4 x 3 1/2 and longer, 2.75; 3/4 x 3 and longer, 2.85.

Scrap Iron.—There is no change to report. Prices are as before. Wrought, \$20 @ \$22.50; Cast, \$14 @ \$15.

Nails.—Are very dull and no large lots are required for. In a small way \$2.15 is obtained from dealers, but the market is dull and weak.

PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., Oct. 21, 1878.

General business, while not all that can be desired by any means, is improving nevertheless, and with the yellow fever subsiding and an early resumption of navigation a still greater volume of business is sure to follow. The most of our large manufacturers are now in operation. Some of them have all they can do, but competition continues active and the margin for profit is small in consequence. Some of our manufacturers are doing as much business now as ever they did, not excepting the so-called "palmy days" of 1865 to 1872, but they complain, and with some reason, too, that they are making but little money. However, there is comfort in the thought that the business interests of the country have been and are still being placed on a solid and healthful basis.

The yellow fever which has been scourging some of the Southern States since early in July is subsiding, and as might be expected, a much better feeling prevails in business circles there. Late advices report that cotton picking is being pushed forward vigorously; that the prospect is fair for a good crop of molasses, sugar and rice, and it is to be hoped that they will be secured before they are nipped by frost. It is evident that those States scourged by the epidemic have very little stocks of all kinds of manufactured goods, and we look for considerable inquiry from that section within the next few weeks for Iron, Rails, Window Glass, Oil, Flows and many other articles bought here largely for Southern markets.

The Pittsburgh and Lake Erie Railroad will soon be completed. The contractor expects to be able to run a train up to the city this week. This new road is an important one to Pittsburgh, as it will give her an outlet both East and West, independent of the Pennsylvania Railroad, and no doubt in time stop the discrimination of the Pennsylvania Company against Pittsburgh. It is a Pittsburgh institution, and the fears entertained by some that it may be gobbled up by the Pennsylvania Company are not likely to be realized, as that matter has been, it is believed, provided for by the projectors of the road. This new road will be of great advantage to the Iron, Coal and Coke trades, and it is destined to do a large business.

Pig Iron.—There has been but little change in the position of the market since the date of our last report. While the volume of business reported was not as large as that of the preceding week, there is no falling off in the demand. On the contrary, there is every reason to believe that the consumption is increasing, as the mills generally have about all they can do, and some of the foundries are quite busy. In

regard to price there has been no quotable change, and while holders as well as producers are hopeful of better prices soon, some conservative operators who are familiar with the situation are inclined to think that there will be no change either way in the immediate future. Indeed, the fact that some that have been idle for some time past, either have already or are about to blow in, has had a tendency to weaken the confidence of those who have been very confident of higher prices. There is no question that so much idle capacity acts as a check on the market, as the fear that some of these idle furnaces, should there be an advance, would be started up, thereby increasing the production, is a very strong point in favor of the bears, and, more than anything else, enables them to keep prices down. In all other respects the situation is favorable to the producing interest. Stocks are light, while the consumption is increasing, and there is no probability of the cost of production being reduced below its present limits without it is done by some new process. Bituminous Coal Irons are still quoted at \$18 @ \$20, 4 mos., for Foundry, and \$18 @ \$19.50 for mill, the latter for all ore Red-short. Coke Irons, \$16 @ \$16.50, cash, and \$16.50 @ \$17, 4 mos., for Forge. Very little Anthracite is coming here, and the movement of Charcoal Irons of all kinds continues very meager. Bessemer Pig is still quoted at \$20, 4 mos., with no sales reported for some weeks, which may be largely due to the fact that the Edgar Thomson Steel Co., the largest buyers, are out of the market, having contracts for all they can use during the remainder of this year.

Manufactured Iron.—In addition to a continued steady demand for ordinary grades, including Bars, Hoop, Sheet, Plate and Tank Iron, there is an increasing inquiry for Bridge Iron, some large contracts having been placed recently, and it is worthy of mention that the railroads are buying more freely. The latter corporations, almost without an exception, ever since the panic, bought only as their immediate actual necessities required, determined to economize every way possible; but now, in order to keep up their roads and rolling stock, they are obliged not only to make increased repairs, but to do some new work, and there is an increasing demand from this source for Iron. For Merchant Iron the demand here has been stimulated by the strike at Philadelphia, as well as the fact that a number of mills here and west of Pittsburgh have been stopped for some time past, owing to financial complications, thereby largely reducing the production. As the yellow fever is subsiding, we look for orders on Southern account within the next few weeks, as stocks at the leading points of distribution in the Mississippi are very much reduced; so that, on the whole, the outlook is favorable for a steady business during the remainder of the year. Merchant Bars steady at 1.75, 60 days, 2 per cent. for cash; Sheet, 2.75, 60 days, for No. 24; Hoop, 2.50, card; Plate and Tank Iron, 2 1/2.

Nails.—Manufacturers report an increasing demand, but no improvement in prices, which to them are very unsatisfactory; the common rate here is \$2, 2¢ off for cash, and at Wheeling, \$1.90, 2¢ off for cash. At these rates it is claimed by makers that there is no margin for profit, and here there is but little doing. Shoenberger & Co. and Chess, Smyth & Co. are still making enough to supply regular customers, while Zug & Co., Jones & Laughlin and Graff, Bennett & Co., it is understood, are doing little or nothing. The Nail trade in the West has been exceedingly unsatisfactory all this year, and there is not much prospect of any change for the better, so far, at least, as prices are concerned until the spring trade opens up.

Wrought Iron Pipe.—This branch of the Iron business has been dull and unsatisfactory all this year, and, like Nails, there is not much prospect of any change for the better until the next summer. The demand for all kinds of Pipe continues light and the discounts are considerably larger than last year, so that there is very little margin, although there would be just as much Pipe wanted at 45¢ off as there is at 65¢ off. There are still some new oil wells being put down, but the price of oil is so very low that wherever it is possible old tubing and casing is being used. There is still a fair inquiry for Boiler Tubes, but no change in discount, which we continue to quote at 40%.

Steel.—The demand is reported as having fallen off somewhat recently, but there is a continued fair degree of activity and is likely to be during the remainder of the year, as the consumption is steadily increasing. No change in prices, although they are reported in buyers' favor. Tool Steel, according to quality, 10 1/2¢ @ 12 1/2¢; Machinery Steel, 5¢ @ 7¢; Spring Steel, 5¢ @ 6¢; Tire Steel, 3 1/2¢ @ 5 1/2¢; Boiler Plate, 5 1/2¢ @ 7¢.

Rails.—Steel Rails in steady demand and firm, but unchanged at \$44, cash, at mill; Steel Rail Ends firm and higher, \$30; Steel Blooms, \$42; Steel Billets, \$46.50, all cash at mill. No transactions in Old Iron Rails since our report of last week; we continue to quote at \$22.50 @ \$23. The enhanced cost appears to have curtailed the demand somewhat; some holders it is said have had the assurance to demand \$24, but as far as your correspondent can learn there have been no sales above \$23, and then only for good No. 1 Rails.

Scrap.—There has been rather more doing during the past week, and prices are firmer but unchanged. Old Car Wheels, \$18 @ \$19, gross, No. 1 Wrought Scrap, \$20, net; Machinery Metal, \$14 @ \$15, gross; Wrought Turnings, \$14 @ \$15, net; Cast Turnings, \$10 @ \$10.50, gross; Boiler Scrap, \$23 @ \$25, net; Car Springs, \$31 @ \$32; Car Axles, \$25 @ \$26.

Window Glass.—There is an increasing business, although it is no better, if as good, as it usually is at this season of the year, and prices continue very unsatisfactory. Your correspondent is informed reliably that there is no combination or association discount; that each firm is at liberty to act in this matter as they please. The supposition is that this has been brought about by a determination on the part of the trade to give those who were the cause largely of the unremunerative rates the benefit of the

same. The very low prices do not increase the consumption. There would be just as much taken at 65¢ off as there is at 75, the common price, and it is to be regretted that rates cannot be kept up at a point to afford a fair margin for profit. But little more than one-half of the capacity here is employed.

CHATTANOOGA.

Yellow Fever, Business and Manufactures.

Office of The Iron Age, Market and 8th Sts., CHATTANOOGA, Oct. 21, 1878.

As if to multiply our difficulties and add to our disasters, the "fire fiend" has put in his appearance. Last Thursday, the 17th instant, the cotton factory of Wildberger, Reyer & Co. was totally destroyed by fire. The fire broke out about 10 a. m., and by noon the whole building, engine house and all adjacent structures were in ruins. The fire was started by some hard substance—probably a small nail or bit of gravel—concealed in a "lap" and passing between the iron rolls of a "spreader" it struck fire. Like the flash of a mass of powder the flames went over the whole floor, a very large one. There was no way of flooding the building. The fire was uncontrollable from the start. A few bales of finished product were hastily got out. Nothing else was saved. The spinning machinery—2,500 spindles—cards, everything, are completely ruined, as is the motive power. The loss will be fully \$35,000; insurance, \$25,000. The mill was mostly owned by Philadelphia parties. The loss falls heavily on the gentlemen immediately concerned, and is in the nature of a public calamity at this crisis of affairs in the city.

On Saturday night, 19th, we had ten incendiary fires of small structures, during the progress of which thieves got in some work on stores, but they secured nothing of much value. Extra vigilance is being observed by the authorities.

The fever has taken a fresh start, despite our frosts of Friday and Saturday nights. There were some twenty new cases reported Sunday (yesterday). The Medical Director has increased his force. The destitution increases in numbers and intensity. The burning of the cotton mill stops the only factory in operation of any kind except the great tannery of J. B. Hoyt & Co., which employs about 34 men. It will be nearly a month yet before any general revival of business can be realized according to present indications. Our great trouble now is to keep refugees out of town and prevent them from adding to our burdens. Deaths by yellow fever for the week ending Saturday, 4 p. m., 35; leaves now under treatment about 225.

BOSTON.

Pig continues very dull. At the shipping points, Foundry No. 1 is quoted at \$16.50 @ \$17; Foundry No. 2, \$15.50 @ \$16.50; Gray Forge, \$14.50 @ \$15.50. Scotch Pig has been selling here at \$22.50 and \$26 for Eglington and Coltness respectively. Glenbrook is held at \$24 and Gartsherrie at \$25. Nails have been in light demand, jobbing now at \$2.25 @ \$2.30. For 100-kg lots \$2.20 is the price. Sheet is selling at 3¢ @ 3 1/4¢. Russia is quiet at 10 1/2¢ @ 11¢. We quote English Spring Steel at 7¢ @ 8¢, gold; 9¢ @ 11¢ for German; 9¢ @ 11¢ for Machinery; 14¢ @ 15¢ for Cast; 10¢ @ 12¢ for Blister; 8¢ for American Spring; 13 1/4¢ @ 14¢ for Cast; 9¢ for Blister, and 8¢ for Machinery. In Plate Iron the only activity in this market is in Tank, which is selling steadily at 2 1/4¢. Boiler Plate is very dull, quoting 2 1/2¢ for No. 1 Charcoal, 2 1/4¢ for No. 1 Shell, and 3 1/4¢ for Flange. Merchant Bar jobs at \$1.70 @ \$1.75. The steamer Pembroke, from Liverpool, brought 36 coils Wire Rope, E. P. Stinson. The Batavia, from Liverpool, brought 96 bbls., 6 cases and 35 plates Steel, H. B. Jackson; 400 bbls. Iron, American Screw Company; 18 bars Iron, J. B. Moors & Co.; 24 bbls. Steel, Randall & Jones; 641 bars Iron, Nightingale & Kilton; 100 packs Iron, order. The Bavarian, from Liverpool, brought 1389 bars Iron, Stevenson & Pearson; 572 coils and 2681 bars Iron, Brown Bros. & Co. Copper is quiet and steady, with light sales all the way from 15 1/4¢ @ 16¢. For manufacturers we quote: New Sheathing at 24¢ @ 26¢. The outside price rules in small transactions, but large buyers are purchasing at the inside figure. Bolts are quoted at 26¢ @ 28¢. Yellow Metal Sheathing continues very weak, quoting 12 1/2¢ @ 13¢ for English, and 13¢ @ 13 1/2¢ for American; Yellow Metal Bolts, 18¢ @ 20¢. Lead is dull and prices are nominally unchanged. We quote: Pig, 3 1/2¢ @ 3 3/4¢, currency; Sheet, 5 1/2¢ @ 5 3/4¢; Tin-Lined Pipe, 12¢; Bar Lead, 4 1/4¢; all of these excepting Pig are subject to the usual trade or 10% discount. Antimony is firm and fairly active, and we quote 12¢ @ 12 1/2¢. Spelter continues firm, with little disposition on the part of buyers to sell on the spot at less than 5¢ for 10-ton lots. Tin is dull and unchanged. The ship Game Cook, Singapore, brought 2002 slabs Tin, Cyrus Wakefield & Co.; 179 slabs Tin, Temple R. Fay. The Batavia, from Liverpool, brought 100 bxs. B. Taggers, Williston, Knight & Co.; 617 bxs. Tin Plates, order. The Bavarian, from Liverpool, brought 718 bxs. Tin Plates, order. We quote: Straits, 13 1/2¢ @ 13 3/4¢; Banca, 16 1/4¢ @ 16 1/2¢; Refined English, 14¢ @ 14 1/2¢, gold. We quote Plate: Charcoal, I. C., \$5.75 @ \$6; Coke, \$4.75 @ \$5; and Charcoal Terme, \$5.40 @ \$5.50, gold.—Commercial Bulletin.

ST. LOUIS.

Special report by Messrs. SPOONER & COLLINS, Iron Commission Merchants, 217 North Third street, under date of Oct. 18. Prices the past week remain about the same as last quotations. There are several lots of cheap iron offered here from the South of a silver-gray nature at very low prices. We make no quotations on those Irons because the quantities are so small. Prices on these Irons range from \$16 to \$17. There being so small a quantity on the market and the parties seem so anxious to sell, we do

not include them in our regular quotations. We can make at all times very low quotations on small lots of iron, but as a general thing the quantities are so small it would not be a fair thing to put them in our general quotations. Old Rails are at the present time scarce and hold firm at present prices. We think, however, there will be plenty for sale in this market soon:

COLD-BLAST CHARCOAL—All Numbers.			
Hanging Rock, No. 1	4 mos.	\$23.00 @ 25.00	
Tennessee, No. 1	4 mos.	23.00 @ 25.00	
Kentucky, No. 1	4 mos.	23.00 @ 25.00	
Missouri, No. 1	4 mos.	23.00 @ 25.00	
Georgia, No. 1	4 mos.	23.00 @ 25.00	
Alabama, No. 1	4 mos.	23.00 @ 25.00	
Assorted Bar Iron	1.00	23.00 @ 25.00	
No. 1 Wrought Scrap	1.00	23.00 @ 25.00	
Heavy Cast Scrap	1.00	23.00 @ 25.00	
Light	1.00	23.00 @ 25.00	
Old Rails, 1/2 ton	4 mos.	18.00 @ 20.00	
Old Car Wheels, 1/2 ton	4 mos.	17.00 @ 18.00	

No. 1.	No. 2.	Mill.	White and M'ld.
Missouri Stone Coal	\$21.00	\$20.00	\$17.80
Missouri Charcoal	20.00	19.00	18.00
Tenn. Charcoal	20.00	18.50	17.50

No. 1.	No. 2.	Mill.	White and M'ld.
Tenn. Coke, very soft and strong	20.00	19.00	17.00
Hang. Rock Charcoal	23.00	20.00	19.00
Hanging Rock Cold-short	23.00	20.00	19.00
Allee Hanging Rock	23.00	20.00	19.00
Coke, No. 1	23.00	20.00	19.00
Oronahala Blackband	23.00	20.00	19.00
Ore	23.00	20.00	19.00

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows under date of Oct. 21: About 400 tons Gray Forge Pig Iron have been received by one of our mills the past week. But little is doing in Foundry Iron. Wrought Scrap and Old Rails continue in demand. I quote as below:

American Scotch Pig Iron	\$21.50 @ 22.50
Anthracite, No. 1	19.00 @ 20.00
" No. 2	18.00 @ 19.00
" No. 3	17.00 @ 18.00
" Mottled	14.50 @ 15.50
Coke, No. 1	19.00 @ 20.00
" No. 2	18.00 @ 19.00
" No. 3	17.00 @ 18.00
Va. Cold-blast Charcoal, Cold-short	20.00 @ 21.00
Va. " " " " " "	20.00 @ 21.00
Va. Warm-blast " " " "	18.00 @ 19.00
Va. " " " " " "	17.00 @ 18.00
Old Rails	15.00 @ 17.00
Wrought Scrap No. 1	16.00 @ 17.00
Cast (machinery)	15.00 @ 16.00
Richmond Refined Bar Iron	20.00 @ 21.00
Horse Shoes per keg	4.00
Mule	5.00
Old Dominion Nails, Standard Size, 1/2 keg	2.25 @ 2.50
Freights to Philadelphia, \$1.40 per ton of 2240 lbs., by rail	
Freights to New York, \$1.60 per ton of 2240 lbs., by rail	

BALTIMORE.

Mr. W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following prices, under date of Oct. 21: There is marked improvement in general business for the past week. Margins continue ruling very close and at unaltered values:

Refined Bar Iron, 1 to 6 wide by 3/4 to 1 thick	1.85 @ 2.00
Refined Bar Iron, 1 to 4 1/2 wide by 3/4 to 1 thick	1.85 @ 2.00
Refined Bar Iron, 3/4 to 1, Round and Square	1.85 @ 2.00
Hoop Iron, 1 1/4 wide and upward	2.35 @ 2.50
Band Iron, 1 1/4 to 1 in. wide	2.35 @ 2.50
Horse-shoe Iron	3.35 @ 3.50
Norway Nail Rod	3.35 @ 3.50
Black Diamond Cast Steel, Plate, Squares and Octagon, ordinary sizes	4.25 @ 4.50
Machinery Steel	13 @ 14
Hot Spring Steel	6 @ 6 1/2
Homogeneous Steel Plate	7 @ 7 1/2
Common Horse Nails	2 @ 2 1/2
R. R. Spikes, 5 1/2 x 10	2 1/2 @ 2 3/4
Perkins' Horse shoes, 8 keg of 100 lbs.	3.50 @ 3.75
" Mule shoes	4.25 @ 4.50
Putnam Horse Nails	10 @ 11
Globe Horse Nails	18 @ 20
Least list discount to the trade	

LOUISVILLE.

Messrs. GEO. H. HULL & Co., under date of Oct. 21, write us as follows: Prices are firm for all grades of Pig Iron, with a moderately good demand. The supply of some brands largely used here is short in consequence of the blockade South. The usual time, 4 months, is allowed on quotations below:

FOUNDRY IRONS.			
No. 1 Hanging Rock, Charcoal	\$21.00 @ 22.00		
No. 2	20.00 @ 21.00		
No. 3 Southern, Charcoal	18.00 @ 19.00		
No. 4	16.50 @ 17.50		
No. 1 Hanging Rock, Stonecoal and Coke	19.00 @ 20.00		
No. 2	18.00 @ 19.00		
No. 3 Hanging Rock, Stonecoal and Coke	18.00 @ 19.00		
No. 4	17.00 @ 18.00		
No. 1 Southern, Stonecoal and Coke	17.00 @ 18.00		
No. 2	16.00 @ 17.00		
American Scotch	16.00 @ 17.00		
Silver Gray	16.00 @ 17.00		

MILL IRONS.			
No. 1 Charcoal, Cold-short and Neut'l	16.00 @ 17.00		
No. 2 Stonecoal and Coke, Cold-short and Neut'l	16.00 @ 17.00		
No. 3 Stonecoal and Coke, Cold-short and Neut'l	15.00 @ 16.00		
No. 4 Missouri, Cold-short and Neut'l	15.00 @ 16.00		
White and Mottled, Cold-short and Neut'l	15.00 @ 16.00		

CAR WHEELS AND MALLEABLE IRONS.			
Hanging Rock, Cold-blast	20.00 @ 21.00		
Alabama and Georgia, Cold-blast	18.00 @ 19.00		
Kentucky, Cold-blast	18.00 @ 19.00		

CINCINNATI.

Messrs. E. L. HARPER & Co. under date of Oct. 19, write us as follows: The demand has been steady and good during the past week, and there are no indications of any disposition to weaken on the part of sellers. We hear of some slight improvement in the prices realized for railroad and other rolling mill products, and the Nail mills at Wheeling are reported to have determined upon a complete stoppage unless an advance can be realized on present selling rates. Should the demand be maintained to its present volume, a further upward movement in prices would not doubt result soon, but as we are already so far advanced in the fall this is hardly probable, and we do not deem it likely that prices will stiffen further during the next four months. In the meantime, however, there does not appear to be any chance for a decline, and it is only a question of time when the ironmaster must realize more satisfactory figures than the present market affords. We revise quotations as follows:

HOT-BLAST FOUNDRY.			
Hanging Rock C. C., No. 1	\$21.00 @ 22.00		
" " " " " "	20.00 @ 21.00		
Allee, No. 1 Extra, L. M.	21.00 @ 22.00		
" No. 1 " " " "	20.00 @ 21.00		
" No. 1 " " " "	20.00 @ 21.00		
Hanging Rock Coke and S. C., No. 2	16.00 @ 17.00		
Virginia Coke, No. 1	19.50 @ 20.00		
Shawnee S. C., No. 2	17.50 @ 18.00		
" " " " " "	16.00 @ 17.00		
Hocking Valley S. C., No. 1	19.00 @ 20.00		
" " " " " "	16.00 @ 17.00		

FOURTH IRONS.			
Hanging Rock, No. 1 C. C.	19.00 @ 20.00		
Hanging Rock, No. 2 Coke	16.50 @ 17.00		
Longdale, No. 1 Coke	17.00 @ 18.00		
Ala. and Tenn. No. 1 C. C.	17.00 @ 18.00		
Red-short, No. 1 Coke	18.50 @ 19.50		
Cold-short, No. 1	15.50 @ 16.00		
Old Rails, prime	15.00 @ 16.00		

CAR WHEELS AND MALLEABLE.			
Hanging Rock C. C.	20.00 @ 21.00		
Cherokee C. C.	18.00 @ 19.00		
Southern Western Brands	18.00 @ 19.00		

FOREIGN.

FRANCE.			
PARIS, Oct. 6, 1878.—Metals.—The failures in England, Scotland and India are not calculated to do business much good. We are afraid these renewed financial troubles in Europe will spoil the fall campaign in many goods, metals included.			

Copper.—The stock of Chili at Havre was the last instant was 7507 tons Zinc against 7570 last year, and of Corocoro 504, against 730 tons, the total visible supply in England and France being 44,757 tons, against 44,985 a month ago and 36,230 a year ago. The price of Chili Bars in England has advanced £66 in 1877. Very little has transpired at Paris, prices meanwhile remaining tolerably steady. We quote deliverable at Havre: Chili Bars, 100 francs the 100 kilos; the 100 kilos, 47.50; Ingots and Slabs, 165; Best Selected, 170; and pure Corocoro Ore, 165. Manganese shows great strength. They quote: Spanish, in slabs, 135.50; Red Tokat, 150; Red Tokat, 150; Sphering, 18.50; Bolts, 122.50; and Yellow Metal ditto, 185. Tin.—The Dutch government will sell in 1879 some 20,000 piculs Banca Tin at public auction. The visible supply in England and Holland on the 1st instant was 18,277 tons, against 18,672 a month ago and 16,604 a year ago. The shipments from Australia to London during the 12 months ended the 1st instant sum up the large amount of 344 tons in view of the crisis and the threatening aspect of financial matters in England, the course of Tin can hardly be anything but a downward one. We have again declined here and quote: Banca, 50 francs; 50 kilos, 175.50; Straits and Australia, 157.50; and English, 157.50. There is still a lack of animation at Marseilles. Banca there may be had at 165, Straits at 160, Biliton at 158 and French at 170. Lead.—Although neglected in view of the crisis and financial aspect in England, no further decline can be announced. We have remained steady here at 40.50 @ 41 francs the 50 kilos. Speculation in Lead has set in in Marseilles, and at anything under current rates there are plenty of purchasers. How long this will last will, we presume, depend upon the duration of the financial crisis now apparently developing across the Channel. They quote at Marseilles as follows: First Fusion, soft, 38.50 @ 38.75; Second Fusion, 38.50; Sheet and Tube, 43.50, and Shot 44. Spelter.—This metal has slightly given way at Paris. We quote Silesian delivered at Havre 47 francs the 50 kilos; other good brands at Havre, 46.50; at Paris, 47. Marseilles the Vieille Montagne Co. has raised its price for Sheet Zinc 1/2 francs the 100 kilos, and now quotes the same 3 francs. Southern sells at 56, all less 30 per cent. discount; Old Remelted, in slabs, 45.50. Iron.—As our readers will have observed, matters in the iron branch are not bright, not only in Belgium, where many valuable orders were being received from abroad, even from Turkey, but also in France, and the general impression among us seemed to be that we were on the verge of more prosperous times, at least in Western Europe, if not in Central Europe. But it seems that we are condemned to see our most legitimate and reasonable hopes and expectations continually thwarted in this line of business. Some of a sudden the great failures at Glasgow and elsewhere across the Channel occur and utterly paralyze the whole iron trade in France, so that we do not attempt giving any quotations, not only for all of our good brands at Havre, 46.50; at Paris, 47. Marseilles the Vieille Montagne Co. has raised its price for Sheet Zinc 1/2 francs the 100 kilos, and now quotes the same 3 francs. Southern sells at 56, all less 30 per cent. discount; Old Remelted, in slabs, 45.50. Iron.—As our readers will have observed, matters in the iron branch are not bright, not only in Belgium, where many valuable orders were being received from abroad, even from Turkey, but also in France, and the general impression among us seemed to be that we were on the verge of more prosperous times, at least in Western Europe, if not in Central Europe. But it seems that we are condemned to see our most legitimate and reasonable hopes and expectations continually thwarted in this line of business. Some of a sudden the great failures at Glasgow and elsewhere across the Channel occur and utterly paralyze the whole iron trade in France, so that we do not attempt giving any quotations, not only for all of our good brands at Havre, 46.50; at Paris, 47. Marseilles the Vieille Montagne Co. has raised its price for Sheet Zinc 1/2 francs the 100 kilos, and now quotes the same 3 francs. Southern sells at 56, all less 30 per cent. discount; Old Remelted, in slabs, 45.50.

Belgium, Oct. 6, 1878.—Iron.—Activity in the Iron and Coal regions of the kingdom has been steady on the increase during the past week, low prices stimulating consumption and attracting orders, also from abroad, presenting the fall trade just about opening in a light rather promising, the more so as there was no apprehension of return labor troubles and disappointments in making prompt deliveries of amounts contracted to be got ready. The future was therefore viewed with increased confidence, and capitalists showed more readiness to once more lend their money to honest industrial pursuits. Unfortunately this flattering aspect has again been interrupted by some unexpected accident, this time in the shape of a banking disaster in Scotland, which has caused our country to look for such a gigantic fraud as seems to have been underlying the management of this huge concern. It is to be hoped that panic may be avoided and that the financial crisis will not be so serious as it appears. The English institutions and firms may not be more disturbed than there seems to be any reason for. But whatever the immediate future may harbor, the time for a similar mishap to occur in Belgium is not so much as it disturbs the fall trade and frightens consumers into abandoning the idea of anticipating wants in any shape for the ensuing winter. Since this news has come to us from Glasgow, the Belgian Iron and Coal markets have been brought to a sudden standstill, prices being nominal and likely to remain so till some conception may be formed as to further developments.

GERMANY.			
BRUNNEN, Oct. 6, 1878.—Iron.—Activity in the Iron and Coal regions of the kingdom has been steady on the increase during the past week, low prices stimulating consumption and attracting orders, also from abroad, presenting the fall trade just about opening in a light rather promising, the more so as there was no apprehension of return labor troubles and disappointments in making prompt deliveries of amounts contracted to be got ready. The future was therefore viewed with increased confidence, and capitalists showed more readiness to once more lend their money to honest industrial pursuits. Unfortunately this flattering aspect has again been interrupted by some unexpected accident, this time in the shape of a banking disaster in Scotland, which has caused our country to look for such a gigantic fraud as seems to have been underlying the management of this huge concern. It is to be hoped that panic may be avoided and that the financial crisis will not be so serious as it appears. The English institutions and firms may not be more disturbed than there seems to be any reason for. But whatever the immediate future may harbor, the time for a similar mishap to occur in Belgium is not so much as it disturbs the fall trade and frightens consumers into abandoning the idea of anticipating wants in any shape for the ensuing winter. Since this news has come to us from Glasgow, the Belgian Iron and Coal markets have been brought to a sudden standstill, prices being nominal and likely to remain so till some conception may be formed as to further developments.			

Germany, Oct. 6, 1878.—Metals.—According to the news wired to us from Glasgow and London it is much to be apprehended that the big failures occurred there may start another storm era of similar mishaps, and this fear has quieted down everything among us, causing the Metal markets to wear a dull aspect just now, but far without any serious decline. Copper.—Hamburg and Stettin report no change. Berlin remains steady at the following quotations: English and Australian, 67 @ 72 marks the 50 kilos; and Mansfield, 72 @ 75.50. Tin.—Our markets are quiet, but no actual decline can be reported, either from here or Stettin. Berlin quotes Banca, 69 @ 69.50 marks the 50 kilos; and English, 66 @ 66.50. Lead firmly sustained in our markets. We quote no change here and at Stettin. Berlin wires the quotation of 17 @ 17.50 marks per 50 kilos for Tarnowitz, Harts and Saxonian. Spelter.—Although not active, Breslau maintains the quotation of 17.50 marks the 50 kilos for good brands Silesian, and Berlin remains steady at 18.25 @ 19 marks.

CHINA.			
(Arnold, Karberg & Co.)			

CANTON, Sept. 6, 1878.—Coal.—The dullness reported in our last circular continued throughout the past fortnight, nor at the close are there any signs of an early change for the better. The market is in a state of complete stagnation, and prices again evidence a weakening tendency. The only movement to report in Australian Coal has been the sale of 100 tons ex. Trowbridge at \$4.50 a ton on credit. This sale, however, is an exceptional one, and could not be reported to-day, no higher offer than \$6.50 a ton being obtainable at present for favorite mines. Though rates of freight in Australia have receded to 16 1/2 a ton, the price now current here must necessarily leave a heavy loss to shippers, and it is to be hoped that this state of things will have the effect of stopping

shipments for a time, so as to allow consumers to clear away a portion of the enormous supplies that have been pouring in of late. Cardiff Coal has held its own, but in the absence of supplies to test the market, it is difficult to give reliable quotations. The visible supply at present is 10,000 tons Cardiff and 12,425 tons Australian.

EAST INDIES.			
(Giffillan, Wood & Co.)			

SINGAPORE, Sept. 2, 1878.—Tin.—Supplies have continued moderate, and owing to unfavorable news from London Tin closes very dull at \$18 1/2 picul. The total exports last month from the Straits to the United States were 220 tons, making for the year to date 2513 tons, against 2055 tons for the same period last year. The shipments from the Straits to the United States during the first eight months have been 41,473 piculs, against 34,121 in 1877; 26,028 in 1876; 31,666 in 1875; 27,734 in 1874; 19,741 in 1873; 34,851 in 1872; 30,909 in 1871; 36,233 in 1870. Instead of improvement we have rather to report an increase in the dullness of our freight market. For New York the S. D. Carleton is more than half full, and the Janet Ferguson has been fixed to succeed her at 20 for dead-weight. The American bark Hawthorne, 705 tons, has been chartered on secret terms to load for Boston. Her cargo will, we believe, consist almost entirely of Tin and Rattans. Exchange has further declined, and first-class credit drafts, 6 months' sight, have been placed at 3/9 1/2 @ 3/9 1/2 dollar.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., Oct. 7, 1878.

THE FINANCIAL DISASTERS which have taken place in Scotland during the past week have, unfortunately, justified the rumors of which I spoke in my last week's communication. The stoppage of the City of Glasgow Bank, with liabilities amounting to over £10,000,000, is a most serious matter for the shareholders, and is certain to bring ruin to many besides. Already three or four firms have succumbed, and these in turn will pull down others. The bank itself appears to have been mismanaged in the most grave and reckless manner, not only in granting cash advances to enormous amounts to four or five firms on exceedingly questionable securities, but in pledging its credit without adequate consideration on acceptances. Ordinarily, British banking concerns are carefully conducted, but in this instance the most obvious rules of commercial prudence appear to have been wholly disregarded, to such a gross extent, indeed, that the bank had come to be a by-word in the city here. "Kittelying" is a dangerous indulgence for any man of business, but it is doubly and trebly reprehensible when made a pastime by those who are virtually acting as trustees for other people. An examination shows that

THE SHAREHOLDERS in the defunct bank are mostly ministers of religion, women and private investors—people who, as a rule, know nothing of the wiles of the money market, and who, in this case, were supremely contented with the 12 per cent. dividends so regularly declared and paid. How these dividends were concocted will no doubt be inquired into presently. By agreeing to pay the notes of the defunct bank the other Scotch banks have doubtless saved themselves from ruinous runs on their own resources, but their action has not saved the various firms who have been favored by the City of Glasgow management, for already

SEVERAL OTHER FAILURES have been announced. On Thursday, Messrs. Smith, Fleming & Co., of Leadenhall street, London, with corresponding houses at Bombay and Kurrachee, have suspended with liabilities reaching about £3,000,000. This firm had long carried on business as East India merchants, dealing largely in metals, among other classes of goods. If I mistake not, they had a "metal mart" in Bombay, and were also largely interested in a certain well-known Indian shipping line. They had had over £500,000 in cash from the City of Glasgow Bank besides £800,000 on acceptances. Their stoppage will probably bring down a number of smaller houses. Messrs. Potter, Wilson & Co., merchants, Glasgow, have also stopped payment with liabilities not as yet precisely estimated. Mr. Lewis Potter was a director of the bank. Another of the directors is said to have had advances to the tune of £2,000,000. Other firms are reported to have been favored to the respective amounts of £2,300,000, £1,500,000 and £600,000. A firm of Clyde shipbuilders has stopped, owing £60,000. When these facts began to transpire there was something like

A PANIC IN THE CITY, which was increased when it became known that large quantities of gold were being taken from the Bank of England by the other Scotch banks, in order to meet the probable calls upon their resources, but the excitement has since subsided, and on going through Throgmorton street and the stock-broking neighborhoods generally to-day I noticed little more than the customary amount of activity thereabouts. The jobbers have, of course, done well out of the fall in all kinds of stocks by "bearing" them down, buying and subsequently selling. Even English railway stocks fell heavily, although there could not possibly be any connection between them and this bank. Probably the most important (to us) issue raised is that affecting the

SCOTCH IRON TRADE, which is undoubtedly in a precarious position. For a long time past makers have placed their surplus pig in the official stores and have hypothesized the warrants as fast as they obtained them. In the usual course of things this is a pretty safe proceeding, but there being now over 100,000 tons in the stores, besides enormous stocks in the makers' own yards, it is felt to be virtually impossible to realize these securities. A firm or a bank may possess an ample reserve in the shape of warrants, but if the security they represent cannot be realized they become practically valueless. This is the case at present. All the old conditions of the Scotch pig iron trade have been reversed of late years; its shipment has largely diminished, and not only so but Cleveland pig has gained position in favor and use

even in Scotland itself. It is therefore plain that a time must come when these losses must cease and stoppages ensue, and that being so no surprise need be felt if announcements to that effect presently appear. On Wednesday last there was no meeting of the Glasgow Iron Exchange and on Thursday warrants went down to 43/6, the lowest price for 30 years. Since then there has been a slight recovery, but even now quotations are not much stronger. Makers' brands as quoted by James Watson & Co. on Oct. 5 are as under:

No. 1.	No. 2.
G. M. B. at Glasgow	45/
Gartsherrie	45/
Coltness	45/
Summerlee	47/6
Langloan	49/
Carburo	45/6
Caldar, at Port Dundas	45/
Glenarnock, at Ardrossan	45/
Eglinton	45/6
Dalmellington	45/6
Scotts, at Leith	45/6
Kinnell, at Boness	45/6

Similar figures are quoted by Messrs. Wm. Colvin & Co. and John E. Swan & Bros. Prices, however, are mostly nominal owing to the unsettled state of the market.

AS A REMEDY, or something partaking of that nature, the Scotch railway companies are said to be about to reduce their rates for the carriage of minerals over the border, and that the owners of the minerals leased by the various iron and coal mine owners are also being requested to lower their royalties in order to keep the Scotch iron trade out of the depths into which it has fallen. I notice that one iron trade paper argues that pig-iron warrants are as good as gold any day. That, I admit, may be so in the ordinary state of trade, but unless the commodity represented is saleable the security is worthless. Of what use to me is a bank note if I cannot get it cashed? Similarly, of what use are bonds which can only be negotiated at a loss for the aggregation of that loss will represent all that is vital and important to the solvency and ruin. Passing on to the consideration, for a brief space, of

THE QUARTERLY MEETINGS to be held during the latter part of this week, it appears tolerably clear that none of the leading ironmasters will find themselves in a position to lower selling prices to any appreciable extent, either in respect of pig or merchant iron. The marked bar makers have already discounted any action of the kind, and there are no circumstances bearing on the subject which are likely to influence prices any lower unless

THE WAIVES QUESTION furnishes such a solution of the problem. The matter is being discussed to-day at Birmingham by both parties under the promised chairmanship of Mr. Joseph Chamberlain, M. P. The manufacturers claim a reduction from 8/ to 7/6 in puddlers' wages and 5/ on millmen's payments. The men will no doubt ask for time to consult their constituents, most of whom strongly oppose any change.

THE ELECTRIC LIGHT is becoming a perfect bugbear. If publicity possesses all the manifold advantages generally claimed for it the new light ought to have an uncommon measure of success, for one can scarcely take up a newspaper without meeting with the subject in some guise or other. At all the gas companies' meetings of shareholders questions are being put to the managers, who seem rather divided in opinion. Most of them, nevertheless, are inclined to the idea that the electric light will be the future illuminator of our principal streets and large interiors, but that it will prove too expensive for domestic and household use. This view is controverted by Mr. Hollingshead, of the Gaiety Theater here, who says he can produce the light at about four-fifths the price of gas. Whether this is so or not the current discussions are rather edifying to the public, albeit damaging to the value of gas shares.

IN CLEVELAND there were last month 95 furnaces blowing and 70 out. The total production of ordinary Cleveland pig reached 134,479 tons, and hematite and spiegelisen, 31,216 tons. The foreign shipments of the month from Middleborough were 34,024 tons, and those coastwise, 32,902 tons. In makers' stocks on September 30 there were 168,986 tons, a decrease of 6216 tons; in public stores, 82,557 tons, and in makers' stores, 38,401 tons.

THE QUARTERLY STATISTICS of Mr. Waterhouse, in detail, set forth that during the three months ending August 31, the average net selling price of North of England iron was £6. 0/5. The recorded sales were: Rails, 5031 tons, average price, £6. 10/; plates, 57,627 tons, average, £6. 4/; bars, 17,755 tons, average, £6. 1/; angles, 22,636 tons, average, £5. 10/; total quantity, 103

still heard at the Amherst Agricultural College, and 240 gallons of syrup and 60 bushels of seed is the estimate of an acre of land. The yield is higher in Minnesota than in Massachusetts, President Clark says, and the larger the cane stalks the better the yield of molasses. The largest yield of syrup from the amber cane at the College mill is 64 gallons from that grown on a quarter of an acre by Henry C. Comins of Hadley, which is at the rate of 256 gallons per acre. The acid taste of the first syrup made has been removed by the use of lime, greatly improving it. Two thousand gallons have already been made, and there is can enough on hand to run two weeks longer night and day.

CONNECTICUT.

Barnum Richardson Company are running two furnaces at full blast at East Canaan.

Griewold's bit factory at Chester was burned last Tuesday week. The loss is \$8500; insurance, \$5500.

NEW YORK.

The Saranac Horse Nail Company have lately made an extensive addition to their works at Plattsburg, N. Y., and are now removing their works from Vergennes to that place. This removal will give them not only greatly increased facilities for manufacture, but also better facilities for the shipment of goods in all directions. The president and general manager of the new company is Mr. S. P. Bowen, of the firm of Bowen & Signor. It will be remembered that this firm are the manufacturers of an exceedingly fine grade of charcoal iron. This iron took a premium at the Philadelphia Exposition, and it is claimed by many of those using it that it is equal to the best brands of Norway iron. The company have the advantage of coming to the trade with goods manufactured from a well-known brand of iron of the best quality. The machinery is new and makes a hammered or forged nail which is claimed by the company to be in quality of stock and finish equal to the best in use.

A special dispatch from Paris says Messrs. Abendroth & Bros., 109-111 Beekman street, New York city, received a gold medal for improved stoves at the distribution of prizes at the Exposition on the 21st inst.

PENNSYLVANIA.

Messrs. Mellert & Co., at Reading, have at present over 100 men employed and are making water pipe for Brooklyn, Rochester, N. Y., Jersey City, Baltimore and other places.

Mr. F. J. Obert, proprietor of the Union Boiler Works, at Reading, has some 65 men employed, who are making six large evaporating pans for the American Wood Paper Works at Royer's Ford; two large liquor pans for the Manayunk Pulp Works; three large boilers for J. & J. Dobson, Schuylkill Falls; two locomotive boilers for Lovegrove & Co., Philadelphia; beer cooler for Frederick Lauer; 24 heaters for Dauth & Obert, and are doing furnace work for C. B. Grubb & Co., Columbia.

We clip the following from the Sharon Herald of the 18th inst.: In Sharon, for the week ending Oct. 12, at Westernman's everything same as last week; all double turn except the bar mill, and that one round a day extra. Blast Furnace No. 2 reaching close to 30 tons a day. Repairing No. 1 will begin some time during the present week. Spearman Furnace, Sharpsville, which blew in Wednesday, is doing well. This furnace will be put on Bessemer stock. That makes 5 in and 17 out in the 8 miles. From West Middlesex, Fanny Furnace doing well, principally Bessemer iron. The rolling mill has seven furnaces on single turn, with another to go on Tuesday of present week.

The Lake Shore road has ordered the construction of 1500 new freight cars. The Erie Car Works have the contract for furnishing 500 of them.

We learn from semi-official sources that the extensive works of Kimberly, Carnes & Co., in this place, will be put into operation at an early day.—Sharon Herald.

Work is quite brisk at the West Reading Boiler Works of Sterling, Weidner & Co. They are building at present two 70-horse-power duplex boilers, a 12-horse-power boiler and a 10-horse-power boiler.

The rolling mill of the Philadelphia and Reading Coal and Iron Co. is running double turn on iron rails.

Some inventive genius has conceived the idea of pumping oil wells by clockwork power. His model is on exhibition at the shops of the Ames Mfg. Co., Titusville, Pa. We wonder why he does not throw the clockwork away and apply the power to the pump direct instead of to winding the clock.

Messrs. Eckert & Co., of the Henry Clay furnaces, expect to have the second stack in blast at an early day.

The Allentown Democrat of the 9th says: Mr. V. W. Weaver, superintendent of the Millerstown Iron Co., lately shipped a lot of iron to Brazil to be made up into tools and machinery in that country. This is a new field for iron shipments, and we hope it will be a large one.

The works of the Enterprise Mfg. Co., Philadelphia, show in a marked degree the progressive tendency of modern manufacture and the adaptation of special machinery to different processes. This is indeed the secret of American supremacy in so many departments. The smoothing and polishing irons, which are among the leading specialties of this company, afford an example of the modern methods; and the way in which the castings are cleaned, buffed on emery belts and wheels, and passed from hand to hand until nickel-plated, polished and fitted with handles, shows remarkable results in the economy of labor. The special process of grinding a number of irons upon a stone shifting its position constantly so as to wear evenly, is done in such a way as to give a smooth face with the requisite convexity. The nickel-plating is rapidly and cheaply effected with the aid of a Weston dynamo-electric engine. The irons are finally polished on muslin wheels, which illustrate the power of centrifugal force. When the wheel is at rest the sheets of muslin hang about like so many rags, but when it is started at a high velocity the circumference will stand a considerable pressure. The handles are also manufactured by improved wood-working machinery, this branch of the business having been recently taken in

hand by the company, much to their advantage.

PITTSBURGH AND VICINITY.

The puddling department of the Etna Iron Works, Spang, Chalfant & Co., resumed work on the 14th, after a stoppage of two weeks. The mill has been undergoing repairs, and the pipe mill at the same works and some of the old buildings are being torn down and new ones built in their places.

The sheet and plate mills of this city are more rushed with orders at the present time than for years. Some of them are running three turns per day. Jones & Laughlin's have for the third crew the workmen from Lewis, Dalzell & Co.

The nail mills of the city are doing but little work. Chess, Smythe & Co. and Shoenberger & Co. are making more than all the others, and are not running nearly full time. Zug & Co. have hardly turned a wheel since the early part of July. Graff, Bennet & Co. and Spang, Chalfant & Co. are virtually out of the market. Jones & Laughlin's run last week to give the nailers some work, and Lewis, Dalzell & Co.'s mill is idle.

The copper and brass rolling mills of C. G. Hussey & Co., Pittsburgh, have recently been enlarged by removing an old addition and replacing it by an extension. The mill of Everson, McCrum & Co., at Scottsdale, is running full time, some days doubling, and has plenty of orders for sheet iron of their manufacture, which is well known as a good quality of iron.

The creditors of Gillespie Bros. & Co., have accepted a proposition made by the firm to pay 50 cents on the \$1; 5 cents in one year; 10 cents in two years; 10 cents in three years; 10 cents in four years, and 15 cents in five years. The firm make a deed of trust of their property on Twenty-first street to Messrs. Henry Lloyd, W. A. Shaw and Jas. B. Oliver. Mr. T. A. Gillespie is to have charge of and operate the works and to make monthly statements of receipts and expenses.

The U. S. Iron and Tin Plate Works at Demmer Station are running full double turn on fine sheet iron, and prospects are that they will remain so for some time; however, no tin or tin-plates are manufactured there at present, and the tinning departments are lying idle and with them a large number of workmen.

Fire has been put under the pots in Chambers' Glass Factory, on the Southside. The factory has been idle for about six weeks.

Work on the Davis Island dam is being pushed rapidly, over 300 men being engaged upon it. The masonry has been commenced on the north wall of the lock and the sewer to carry off surface water completed.

The Keystone Mill has been re-leased by the McKeesport Tube Works Company.

Bradley & Co., Pittsburgh, are shipping two carloads of stoves per day, and say both the wholesale and the retail trade is good.

The new foundry at McKeesport is completed, and has been put in operation.

OHIO.

A consignment of iron from the Akron Iron Company to a firm in New Orleans, shipped just before the yellow fever epidemic, has never reached its destination and all trace of it has been lost.

The Girard Furnace is in blast. Monitor Furnace is making 10 tons of good cold blast daily.

The foundation for the new engine at the Etna Mill, to be run by the Cleveland Rolling Mill Company to work hoop mill, is being actively pushed forward. It is expected the mill will be ready to start in a short time.

The Valley Railroad Company have made a contract with the Cambria Iron Company, of Johnson, Pa., for the steel rails required for the line now under contract.

Of the three works at Ironton the Belfont Mill is the only mill running full time. The Lawrence Mill is waiting for the river to rise before going into operation. A meeting of the stockholders and bondholders of the Iron and Steel Works is called for the 22d, to consider future plans.

The Burgess Iron and Steel Works, Portsmouth, are busy with a large number of orders for their steel and iron-steel plates and merchants' sizes, especially for the manufacture of agricultural machinery, &c. They are erecting a 7-ton Siemens open-hearth furnace. The four gas producers occupy a foundation of 40 x 20 feet, while the furnace itself will stand on a 40 x 23-foot foundation. The cost of the furnace proper will amount to \$7000, and that of the whole plant to \$10,000. This will be completed in about four weeks.

Without including that in the Hocking Valley the furnaces of the Hanging Rock iron region have now on hand and unsold a stock of 47,500 tons of pig metal.

The Cleveland Rolling Mill Company have leased the property of the Cleveland Iron Company for a term of years.

INDIANA.

The Green Castle Iron and Nail Works are running to their fullest capacity, with good prospects.

KENTUCKY.

Charlotte Furnace, running on one-third Lambert and two-thirds limestone and Top-hill ore, is making a daily yield of 13 tons of foundry iron.

Hunnell Furnace is now averaging from 15 to 19 tons of good foundry metal per day.

Pittsburgh is in a fever over the rigid enforcement of an old Sunday observance law dating back somewhere in the 1790s. It was first enforced against liquor stores and cigar shops. The owners of the latter thinking "turn about was fair play" began its enforcement against manufacturers, through the Liquor League, conveyances of all kinds and even milk women, and now all essentials for the inner man, both fluid and solid, have to be purchased Saturday, and many of those inclined to Sunday worship have to stay at home or foot it to church. The manufacturers who find it necessary to work on Sunday have determined to go on in defiance of the warning published by the Liquor League. The glass men say that if they were compelled to suspend operations on Sunday, each factory would

suffer a loss of about \$1000 per week. The steam railroads are operated as usual, and it is said the officers of the various roads have determined to pay no attention to the threats of the League, preferring to stand their prosecutions and test the question in court.

A Report upon the Use of the Electric Light at Paris.

Mr. G. Warren Dresser, C. E., the editor of the *Gaslight Journal*, has just published in that paper a long and very interesting report of his investigations in Paris upon the electric light, the principal portions of which we publish below. While the facts are clearly and well stated and many points brought out which have heretofore been overlooked, it must be remembered when reading his conclusions that he is intimately connected with the gas-making industry of this country, and that his interests and prejudices are all with gas against electricity as a source of light.

I found in use, in various places in Paris and elsewhere, practically, two systems, viz.: the Jablochhoff, which requires no "regulator," and another system in which a regulator is used to keep the carbon points at the proper distance apart, in order to have the "voltaic arc" formed between them. Of the latter there are several kinds, as made by different patentees.

It is principally in the arrangement of these regulators and in the manufacture of the carbon points that progress has been made; but there are none of them, nor any combination of any of them, that give a perfectly steady, uniform light. And I was informed by the officials in charge of the lighthouses at South Foreland, near Dover, England, where the electric light has been in use for seven years, that so far as the carbon points were concerned none gave such satisfactory results, after very many tests, as the plain sticks of carbon obtained by saving them out from the cakes of carbon found in gas retorts.

In both systems the electricity is derived from some form of magneto-electric machines, which are driven by power at a very high rate of speed.

The power used in Paris is principally steam, and the amount required is estimated by different electricians to be from one to five or six horse power per lamp; but I do not think that an average of two and a half to three horse power per lamp would be far from the facts.

In some instances gas engines are used, and it was stated that a much more uniform speed was obtained from this motor than from any other. The Otto silent gas motor, which is now made to give 8-horse power, works most satisfactorily, and is used with a consumption of gas not exceeding 35 cubic feet of gas per horse power per hour.

Unquestionably the Jablochhoff system has attracted more attention than any other.

The Jablochhoff candle, so called, consists of two rods, or needles, of carbon placed side by side, and kept asunder or insulated from each other by a layer of plaster of Paris or a mixture of plaster and kaolin. The carbons are made from retort carbon, ground fine and then pressed together, some cementing material having been added. They are each about one-eighth inch in diameter and 10 inches long, and are firmly fixed into metal sockets, to which the wires are led and the connection with the machine is made. When new the tops of the two sticks only are joined by a small bit of carbon.

One of these will ordinarily burn from 1½ to 1¾ hours. The proportions adopted are those which experience has shown to be the best. Four of these are usually fixed on a stand and placed within a large opal glass globe about 18 or 20 inches in diameter, on the top of a lamp post which is considerably higher than those commonly used here. As one of these "candles" burns down the current is shifted to the next, and so on until the four are consumed; so that at the outside, the street lamps would continue burning six hours, when the set of four candles has to be replaced by others.

As a matter of fact, the various street lights of this system were lighted about 7 or 7.30, and were all extinguished by 12 at night, when the gas lights were lighted and continued to burn till morning. Three steam engines and one gas engine furnish the power for the lights in the Avenue de l'Opera, and at the Orangerie two 35-horse-power engines are running six electric machines for the light there. It can be seen from this that quite a large item of expense would arise from the attendance required—first, to daily put the candles in place, and, secondly, to shift the currents from one to another candle as it burned down.

The price of each candle was stated to be 60 centimes, or 12 cents. If each one of these averaged to burn for 1½ hours the cost per hour of the candle alone, without charge for interest on machinery, &c., or cost of necessary attendance, would be 9.35 cents each. In the Avenue de l'Opera the electric lights, when burning, take the place of about 10 gas lamps, and these gas lamps are much nearer together than in New York city.

At the present time the street lamps in New York below Thirty-fourth street are lighted for \$12 per annum, including all charges for cleaning, painting, &c., or at the rate of about \$1 per 1000 cubic feet of gas furnished. The lamps are to burn 3 feet per hour; 10 of them would consume 30 feet per hour, and the cost for the gas, care, &c., of the 10 lamps would be 3 cents per hour, or about one-third of the price of the Jablochhoff candle alone, as used in the Avenue de l'Opera in Paris.

What the other charges would amount to it is extremely difficult to determine, as we found the greatest dearth of actual data on this point.

I was informed that the estimated cost per hour of running four lights, carbons included, was 3 francs and 54 centimes, which would be 88½ centimes per hour per light.

We do not think this is a fair statement of the case, because the shifting from one candle to another as the carbons are consumed is automatic and requires no attention from an attendant. The amount of light furnished by the electric candles as compared with the amount from the street lamps should be made the basis for comparison.

which would be equal to about 18 cents currency.

It is argued that while it costs more, there is much more light furnished; but this gives rise to the very important question as to how much of this additional light is useful light, leaving out of the account the character of it. And at this point I would most decidedly take issue with most of the estimates that the promoters of the electric light give of its value in standard candles. It is called a light of 1000, 1200, 1500, even 2000 candles.

I am willing to admit that when an attempt is made to patch up an ordinary photometer, and try to compare this intensely illuminated point with the light of ordinary candles, or even with the Carcel lamp, which is about 10 candles, the results indicate fabulous figures, and well they might, for a variation of 100 or 200 candles would thus be hardly perceptible. But what I mean to assert is this—that taking four of Mr. Sugg's triple-ring arc lamps, which give a light of 250 candles each, and light them in any proper place, they would give much more light than the 1000-candle-power electric light.

The intensity of the electric light may show on the small shaded disk of the photometer a very high illuminating power; but the volume is lacking. It has not diffusive power. This results from surface of light, or the number of luminous points that throw off the light.

Of the system of electric lighting where regulators are used we saw a number of specimens. The Serrin regulator was the first, I think, and has been in satisfactory use for years. But recently there has been much money, time and talent devoted to the study of electric science, with a view of developing this light, and there have been many regulators presented for public approval. The most prominent are those of Messrs. Carré, Jasper, Halte and Lontin.

The object of the regulator is to preserve the relative positions of the carbon points as they are being consumed. The light is formed as the current passes from one point to the other.

In order to start the light the points are in contact, so as to establish the circuit through them, then they are drawn slightly apart, say a distance of one-eighth of an inch, and the Voltaic arc is formed between the two ends. The object of the regulator is to hold the carbons in position, to maintain this short distance between the points, and to keep the carbon points moving toward each other as they burn away. It will be seen that such an instrument must be somewhat complicated and expensive; but yet there are several that appear to function almost perfectly when the carbons burn uniformly.

The lights from these lamps are not different in character from the other system. It is usually this kind of apparatus that has been applied in military and engineering works, to the lighting of foundries, railroad stations and other large areas.

At the station St. Lazar the electric light was in use in portions of the yard, and in freight houses, and preparations were being made to introduce it into the passenger station; but I understood that this was being done at the expense of the manufacturers of the apparatus for the purpose of trial.

It was claimed by the promoters of the various systems that there were as many as 1000 applications of the electric light in France. It was at a season of the year when no artificial light was required in the various mills and other places where it had been introduced, and, consequently, no opportunity was afforded of seeing the practical working of the light in such places; but a correspondence with some of the parties who had tried it resulted in about the same contradictory replies as in other places. One gentleman who was employing a large number of men in the manufacture of articles requiring great accuracy of workmanship claimed it to be superior to any other light in all respects; while others who had tried it in mills where weaving and spinning was done pronounced most decidedly against it, and in some cases had discontinued its use.

The most perfect exhibition of the light that I saw was at the establishment of Messrs. Sautier & Lemonnier. This firm have been engaged for some time in making among other mechanical work lighthouse apparatus, and they are the makers of electric light apparatus for military and engineering purposes. They placed the regulator in a vessel which entirely concealed the direct light from view. This was suspended near the ceiling of a room about 30 x 60 feet, well whitewashed on all sides, and at the top; all the light coming as reflected light from the ceiling, and the piercing brilliancy of the lamp being cut off from view, the result was a very strong, well-diffused light, with but little shadow, but, nevertheless, very trying to the eyes when used for a short time.

M. Lemonnier also showed the use of the light in front of a reflector, fixed on a stand, with universal joint, so that it could be turned in any direction. These were on the balcony of a high tower; and I believe I am not exaggerating in the least when I state that a man could be clearly distinguished, at night, at a distance of three or four miles when within the rays of light.

Undoubtedly there is a great difficulty in measuring the power of the electric light, but until there are some more accurate experiments than those already made, we must not be misled by the simple statement of an observer and conclude that the quantity of light has been greatly overestimated.

This is a sweeping statement that is very likely to deceive. The liability to go out is, so far as we can learn, entirely a matter of the apparatus as at present constructed, and by no means inherent in the electric light. This portion of the report sounds very much like some of the remarks made by the president of a gas company in regard to the light, who based his opinions upon one of the most imperfect forms of apparatus in the market. It is evident that the present apparatus is not all that could be desired, but it is equally evident that to predicate what can be done with the light in the face of the rapid improvements that are being made, is both unwise and unjust.

The cost of an electric light is as easily found by measuring the power required to produce it, or the intensity and quantity of the current required, as to find the cost of a given quantity of coal gas. It is easy by means of a meter to find the quantity of gas used in a house, but it by no means follows that the proper amount of light is produced from it. In the use of the electric light there will be no greater inconvenience in measuring and selling a given amount of light than in the case of gas.

The color of different houses, three miles away, could be as easily distinguished as by daylight. And it is here, in special uses, that the electric light is of great value. I look upon its introduction as that of a coordinate branch of illumination, in the same way as the calcium light is; but I cannot see where any hostility or competition can arise between it and gas-lighting.

As to the different machines used for generating the electricity there are the usual number of competitors. The more prominent is the one known as the "Alliance," perfected by Messrs. Nollet & Van Malderen. The Gramme, the Siemens, the Lontin machines, in France, and the Holmes and the Siemens in England; while we have in our own country several that are probably equal to any of them.

Then behind all these, viz., the carbons and the regulator, the cables connecting these, with the machines, and the machines themselves, comes the motive power. Steam boilers, furnaces, coal, stokers, &c., so that it will be seen that it is not so simple a thing after all. And, what is more, supposing the character and cost and quality of the light to be what is wanted exactly, it is not a reliable light, so simple are the causes that may extinguish it. In fact, there is no certainty that it may not go out at any moment.

Another point, which is a commercial one. How is the electric light to be measured and sold? When gas is bought the amount of light that may be derived from it is known. The quantity is accurately measured, and the quality is officially determined. From all this you will see, I am sure, that as gas makers the electric light may be welcomed by us as an ally and coadjutor, and not as an enemy.

Too much credit cannot be given to the zeal and energy with which the electricians of the present day have given themselves to this subject.

The Supreme Court of Ohio recently held that where a national bank makes to one of its directors a loan of money, which, in amount, and in the rate of interest, is in contravention of the National Banking Act, the borrower is not estopped to defend against a recovery of interest.

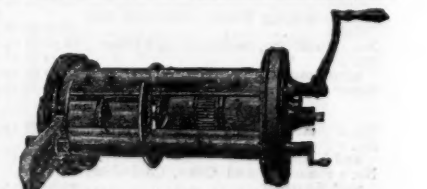


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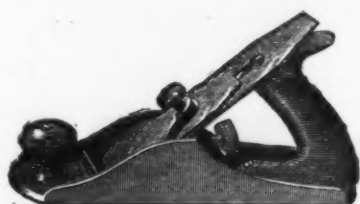
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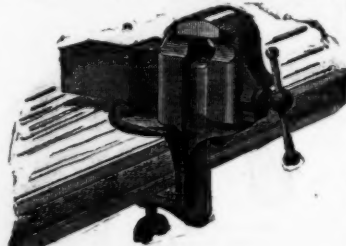
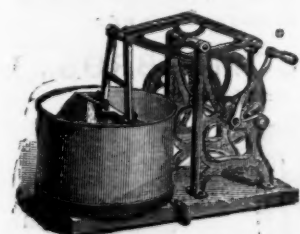
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**PUTNAM'S
HOT FORGED & HAMMER POINTED
Horse Shoe Nails.**



Made from the best of Norway Iron.
The only hot forged machine made Horse Shoe Nail in the world that is not sheared or cut on the point. Warranted never to split or silver in the driving, and to hold the shoe longer than any other Nail. For sale by the hardware and iron trade generally.

PUTNAM NAIL CO.,
P. O. Address, Neponset, Mass. **BOSTON.**

ANVIL NAIL CO.

We desire to call the attention of the trade to our new manufacture of

Steel Horse Shoe Nails,
made from metal prepared in the Martin-Siemens Furnace by our PATENT process, which produces a nail having all the requisites for a

PERFECT HORSE SHOE NAIL.

The well-known desirable properties of a perfect nail are, that the POINT should be sharp, the SHANK stiff, to drive without crippling under the hammer, soft enough to clinch readily, while sufficiently tough to avoid all danger from the "drawing the clinch" or breaking the neck under the head. These properties we claim for the

"ANVIL HORSE NAILS."

In the process of manufacture the metal is compressed under the head, which gives the nail great strength where it is required (between the shoe and hoof), and the cold rolling gives it a stiffness attained in no other way, while the quality of the metal used insures a clinch and point unsurpassed by any nail ever offered in the market. Samples and prices sent on application.

ANVIL NAIL CO.,
65, 67 and 69 Washington St., New York.

Established in 1839.

Formerly L. & A. G. Coes.

L. COES & CO.
Manufacturers of L. Coes'
GENUINE IMPROVED AND MECHANICS

Patent Screw Wrenches

JUNE 26, 1866,
MARCH 23, 1869,
REISSUED 1870.

UNDER PATENTS DATED

NOVEMBER 10, 1863,
FEBRUARY 23, 1864,
REISSUED JUNE 1, 1869,
IMPROVED AUG. 1, 1877.

The back thrust when in use borne by the SHANK instead of the Handle.
None genuine unless stamped "L. COES & CO."

WORCESTER, MASS.

Warehouse, 97 Chambers St., & 81 Reade St., N. Y.
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The 1878 Pennsylvania Lawn Mower.

LIGHT DRAFT AND EASILY ADJUSTED:



This machine presents all the advantages of a light and durable LAWN MOWER, and we believe has good qualities which cannot fail to be appreciated. It is the lightest machine in use, and all that is necessary to satisfy our customers of its superiority is to place it in competition with any other machine in the town in which they may reside.
Every machine warranted to work as represented.

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12	8 in. driving wheel. Can be used by a child. Each, \$14.00	
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16	8 in. driving wheel, wt. 34 1/2 lbs. Can be used by a lady. " 20.00	
18	8 in. driving wheel, wt. 35 1/2 lbs. One man size. " 22.00	
20	8 inch driving wheel. One man size. " 24.00	

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**THE "NEW" CROWN
Christmas Tree Holder**



is offered to the public as a decided improvement upon last year's style, in the hope of meeting with a largely increased demand during the present season.

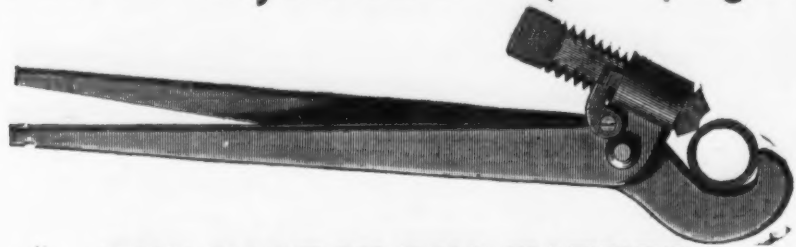
The usefulness of this article is obvious to anyone who has tried to arrange blocks, boxes or other appliances for holding Christmas Trees.

This Holder is so constructed that it will firmly clamp and hold any size tree under three inches diameter. The legs are placed in the sockets and fastened by the small thumb screws; the ring nut is turned downward, whereby the clamps are thrown outward. The tree is then set in the holder, and the ring nut turned upwards until the clamps have a sufficiently tight hold. If desirable, the holder can be fastened to the floor, &c., by means of small tacks and screws. Should the tree shrink and become loose in the holder, a slight turn upwards of the ring nut will tighten it again.

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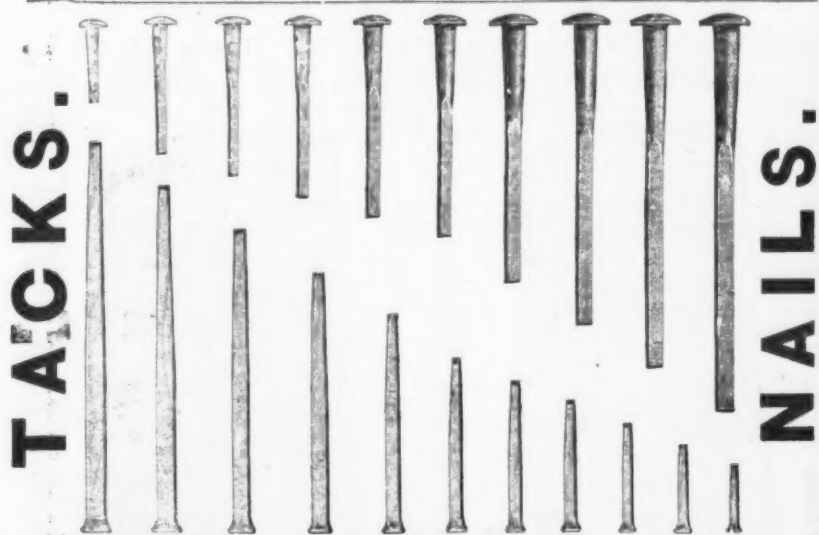
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THE BEST IN THE MARKET.

Send for Samples.

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TACKS and SMALL NAILS Of Every Kind.

COPPER, ZINC, STEEL & SWEDS & COMMON IRON SHOE NAILS, &c.
Copper, Iron and Galvanized Boat Nails,

Regular or Chisel Pointed.

Brass & Iron Wire Nails, Moulding Nails and Escutcheon Pins, Chair & Cigar
Box Nails, 2d & 3d Fine Nails, Roofing Tacks and Nails, &c., &c.

MADE BY THE

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A full line of goods may be found at our

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Price, \$5.00.
In Morocco Case,
\$5.50.

MICROMETER CALIPER,
Made by THE VICTOR SEWING MACHINE CO.
Middletown, Conn.

This attractive and very desirable tool will be found more reliable and convenient than the Vernier Caliper, and to Machinists and Tool makers it is indispensable on work requiring very accurate and close measurement. Its capacity is one inch, and is graduated to one thousandths, but can readily be set one-half and quarter thousandths; and is so constructed that any wear resulting from use can be readily adjusted.

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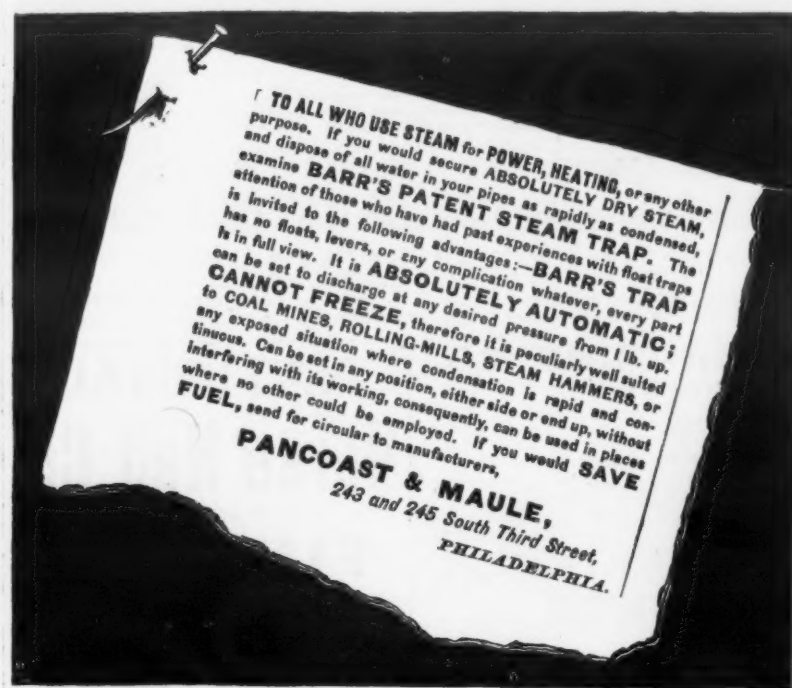
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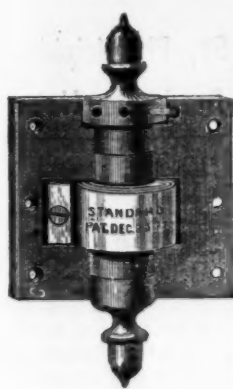
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\$2.50.	\$8.00.	\$9.00.
22 Cal.	38 Cal.	41 Cal.
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PRICES.

Single-Acting.

	Per pair.
2x2	\$.75
2 1/2 x 3 1/2	1.00
3x3	1.50
4x4	2.00
5x5	3.00
6x6	4.00

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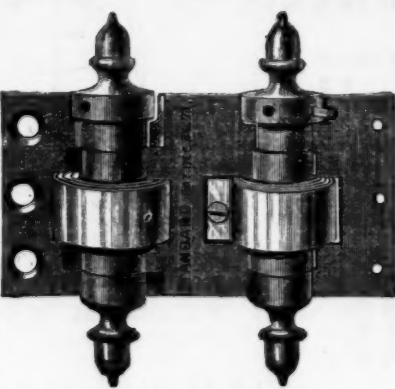


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Perfection
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3 feet	\$2.50
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2 1/2 x 3 1/2	\$2.00
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Hardware Manufacturers & Manufacturers' Agents.
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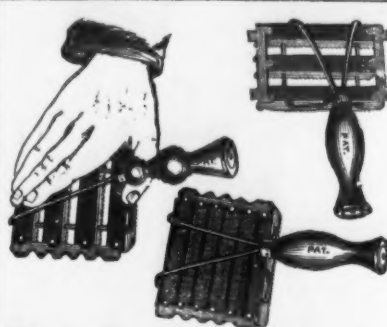


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J. J. Shannon,
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Recommended as the best hand Clipper made.
\$3.50 EACH.
Extra pieces for sale.



The Perfect Comb.

We call your attention specially to our new patent end-less wire frame comb. The result of a long series of experiments, made with a view to meeting all the requirements of a Perfect Comb, it is better, stronger, and more durable than any ever before invented. The raised wire shank gives what has never before been attained, viz: a rest and brace for the thumb, in such a position that the hand cannot come in contact with the horse while using the comb. The wire braces which run from the shank over the back to the front teeth give strength and durability in a direction never heretofore attained, and at the same time serve as an extra handle; and when clasped by the fingers in connection with the raised shank the comb is more firmly, easily, and completely held, and with much less fatigue to the hand than is possible in any other formation—in short, it needs but a trial to vindicate its name: The Perfect Comb.

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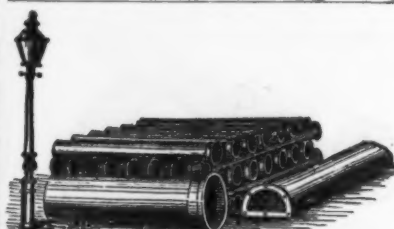
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PATENT
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Closets,
PUMPS, CABINET WOOD WORK, &c.

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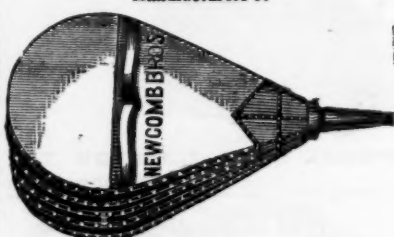
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FOR WATER AND GAS.

Lamp Posts, Valves, &c.,
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400 CHESTNUT STREET.

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I invite special attention to my

PATENT

Reversible
Nozzle.

These Bellows are well adapted and put up for export trade. I manufacture all sizes, with or without this improvement.



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FOR

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PRICES REDUCED ON ALL STYLES.

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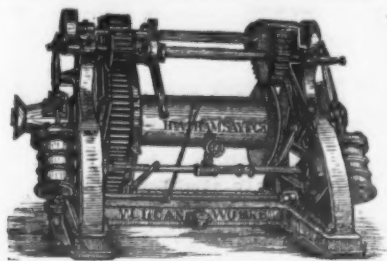
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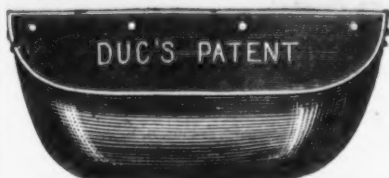
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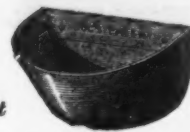
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No Corners to Catch.
Light Running and Very Durable.
The only Scientifically Constructed Elevator Bucket
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In 3 1/2 in. to 10 in.
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Patented December 25th, 1877.



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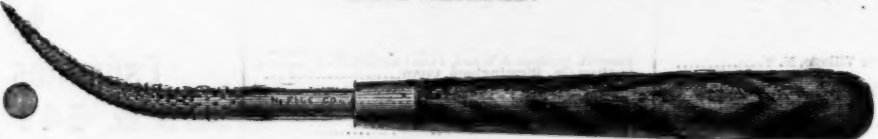


PATENT STEEL.

BENT RIFFLERS—Handled.



HAND BASTARD.



ROUND RASP.



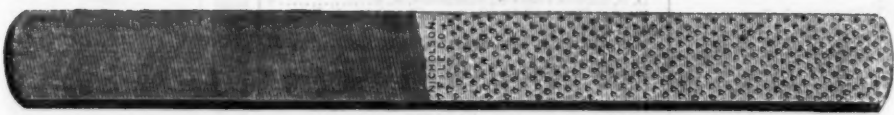
FLAT FLOAT (Safe Slides).

BREAD RASP.



Full Size—12 inches.

JIG RASP.



Full Size.

ROLLER FILE.



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Steam Gauges, Belting, Chucks, Drills, Packing, Governors, Jacks, Oil Cups.

STEAM PUMPS for Pumping, Fire Purposes and Boiler Feeding.

Also VALVES, PIPING and VISES.

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EVERY WRINGER WARRANTED.

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Sold by the Principal Jobbers in Hard-
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Special rates given for export.

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"The Martini Caster is superior to any in use."
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Lock Manufacturer and Hardware Dealer,
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TUCKER & DORSEY,
MANUFACTURERS.



We make till either for
Cash or Scrip.

Our Lock
has no
Rival

PHILADELPHIA HYDRAULIC WORKS,

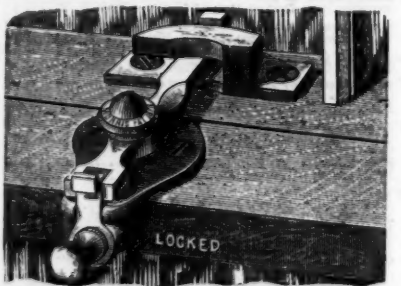
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Steam Pumps and Steam Fire Engines.

Manufactured by
STEAM CRANE BROS.,
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Patented July 2, 1878. The Safest! The Simplest!
The most Reliable! The Best! N. B.—No springs to
get out of order. Sold by all hardware jobbers. Man-
ufactured by the MORRIS SASH LOCK MFG. CO.,
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Price List and Samples furnished to the trade on
application. A liberal discount to the trade.

Patent Portable Hoisting Machines

PRICE LIST.

To Lift	To Raise	Price.	Ex Ft.
5 ft.	500 lb.	\$22 50	\$1 00
8	1,000	35 00	1 50
10	2,000	50 00	2 25
12	3,000	65 00	3 00
14	4,000	80 00	3 75
16	5,000	95 00	4 50
18	6,000	110 00	5 25
20	8,000	150 00	7 00
22	10,000	200 00	9 00
24	12,000	250 00	11 00

EDWIN HARRINGTON & SON,
Also Manufacturers of Machin-
ists' Tools.
15th St. and Pennsylvania Ave.,
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Henry Disston & Sons,



FILE COMPANY, Limited.

FACTORY, Tacony, Philadelphia.

OFFICES, - Front and Laurel Streets, Philadelphia, Pa.

All kinds of

DISSTON CHOICE TAPER.

Slim and Regular

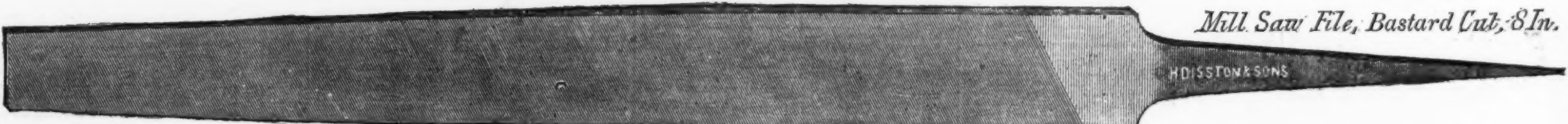
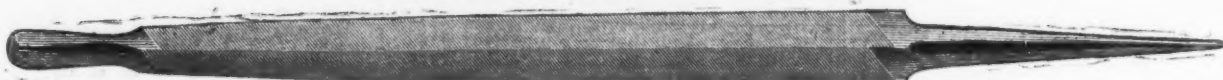
TAPERS

TAPERS

made to order.

Price same as Regular Taper, length to include the Tip.

kept in Stock.



Mill Saw File, Bastard Cut, 8 In.

Size,	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	Inch.
Price,	\$1 40	1 60	1 85	2 20	2 60	3 00	3 65	4 35	5 25	6 10	7 30	8 75	10 50	12 50	14 75	20 00	



Flat File, Bastard, 8 In.

Size,	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	Inch.
Price,	\$1 40	1 60	1 85	2 20	2 60	3 00	3 65	4 35	5 25	6 10	7 30	8 75	10 50	12 50	14 75	20 00	



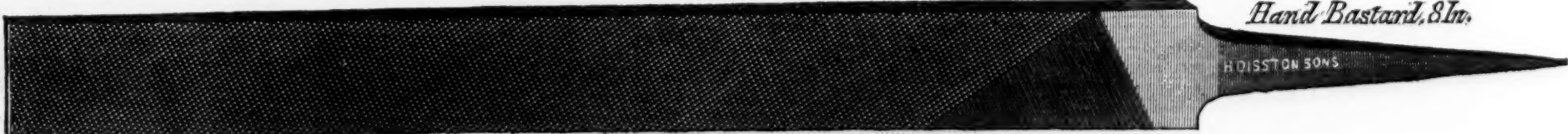
Round File, Bastard, 8 In.

Size,	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	Inch.
Price,	\$1 40	1 60	1 85	2 20	2 60	3 00	3 65	4 35	5 25	6 10	7 30	8 75	10 50	12 50	14 75	20 00	



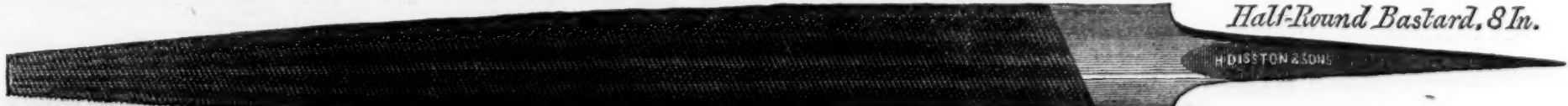
Four-Square File, Bastard, 8 In.

Size,	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	Inch.
Price,	\$1 40	1 60	1 85	2 20	2 60	3 00	3 65	4 35	5 25	6 10	7 30	8 75	10 50	12 50	14 75	20 00	



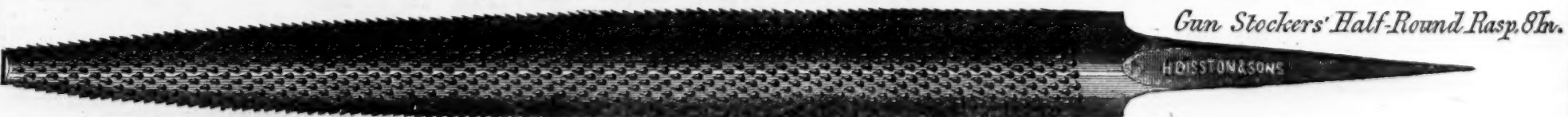
Hand Bastard, 8 In.

Size,	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	Inch.
Price,	\$1 60	1 90	2 25	2 65	3 10	3 60	4 25	5 00	5 75	6 75	8 00	9 50	11 25	13 25	15 50	22 00	



Half-Round Bastard, 8 In.

Size,	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	Inch.
Price,	\$1 60	1 90	2 25	2 65	3 10	3 60	4 25	5 00	5 75	6 75	8 00	9 50	11 25	13 25	15 50	22 00	



Gun Stockers Half-Round Rasp, 8 In.

All the general Standard Files kept in Stock.

All the different cuts kept in stock or made to order.

All the different lengths and cuts of the regular Standard Files, and all our special Files kept in stock. All kinds of other special Files made to order.

Every File of the above brand is made with the greatest care from the best of steel, and inspected and proved in the most thorough manner before leaving the works. Every File stamped "Disston" is warranted as perfect as Files can be made, and are considered superior to any other Files known to us. The increasing demand for them, and the growing favor in which they are held by all who use them, is the best evidence of their excellence.

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Sundries.

Asphaltum.....	on
Benzine.....	7 gal. 95
Chalk.....	84
" Block.....	33 @ 16
Dryer, Patent, Am'd.....	best cans, red; keg, 9
Frosting.....	416
Glass, White.....	250
" Sheet.....	250
Glaziers' Points, Zinc.....	30
" Gum, Copal.....	250
" Damar.....	250
" Shellac, English.....	350
Litharge, English.....	30 gold
Mineral Wool.....	15 @ 15
Oiled.....	250
Powdered.....	250
Putty, in bladders.....	250
Rotten Stone, soft, English.....	30
Spirits Turpentine.....	30
Whiting Spanish.....	30

Glass.

FRENCH WINDOW GLASS.
Prices current per box of 50 feet. *

Single Thick.—discount 60¢ & 5 ¢	
SIZES.	1st. 2d. 3d. 4th
6 X 8 to 10 X 15.....	\$ 2.50 \$ 5.75
11 X 14 to 15 X 24.....	7.50 7.75
13 X 22 to 20 X 30.....	10.75 9.75
15 X 30 to 24 X 30.....	12.25 10.75
20 X 28 to 34 X 36.....	13.00 11.50
20 X 37 to 26 X 44.....	14.50 13.25
20 X 48 to 30 X 54.....	15.00 14.00
In bulk.....	15.63 14.50
30 X 50 to 34 X 54.....	17.25 15.50
34 X 50 to 34 X 56.....	18.25 17.25
30 X 60 to 40 X 60.....	20.75 18.75

Double Thick.—Discount 60¢ & 15 ¢

SIZES.	1st. 2d. 3d. 4th.
6 X 8 to 10 X 15.....	\$12.00 \$11.00 \$10.00 9.75
11 X 14 to 15 X 24.....	13.75 12.50 11.75 10.4
18 X 22 to 20 X 30.....	17.25 15.75 14.00 12.5
15 X 26 to 24 X 30.....	19.75 17.75 16.00 14.5
20 X 28 to 24 X 36.....	21.00 18.50 15.75 14.5
20 X 36 to 26 X 44.....	23.25 21.25 17.25 15.5
20 X 48 to 30 X 54.....	15.63 14.50 13.00 11.5
30 X 52 to 30 X 54.....	25.75 23.25 19.25 17.5
30 X 50 to 34 X 56.....	27.75 25.00 21.75 20.0
34 X 50 to 34 X 56.....	29.25 27.75 24.50 22.5
30 X 60 to 40 X 60.....	33.25 30.00 27.75 25.0

Sizes above 40 X 50—\$10.00 per box extra for every five inches.

An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 50 inches in length, and not making more than 8 united inches, will be charged in the 84 united inches brace.

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erstocks, or goods that
they wish to close out
tes, may find purchas-

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"Double Rim."

blong, Nineteen Sizes.

With a very handsome O. G. edge, and lined with
is the same as heretofore, but improved in finish
years. It is the safest and most durable Board
appearance as the Iron-Clad. The beading is
ied under the full width of the bead.

CURED BY
PARD & CO.,
Buffalo, N. Y

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**Porcelain, Nickel-Plated and
Bronze Whistles.**
Plain or with indicators,
**Speaking Pipe,
Bell Tubing,
Levers, Slides, &c.**
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143 Chambers St., New York

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IRON AND STEEL.

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Pr. HOMOGENEOUS DEC. CAST STEEL, GUN BARRELS, MOULDS AND ORDNANCE.

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Successors to **SAML. COCKER & SON, (ESTABLISHED 1752.)**
SHEFFIELD, ENGLAND.

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AND
CAST STEEL WIRE for all purposes.

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Railroad Supplies and General Merchants.

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Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.

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PUNCHES and all kinds of MACHINISTS' TOOLS.
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The most popular Powder in use.

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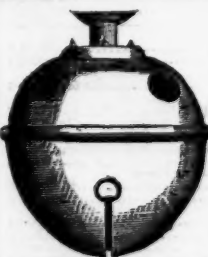
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It is a Right Hand Sheller. Frame made of hard wood, Shafts of wrought iron. The parts are carefully fitted, ensuring durability, and ease to the operator. The panels are tastefully painted and the frame neatly striped, and all the woodwork well varnished.

The Hopper is adjustable, rendering it capable of easy adjustment to either large or small corn as required. For price and terms, address

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Warranted the strongest and best goods made.

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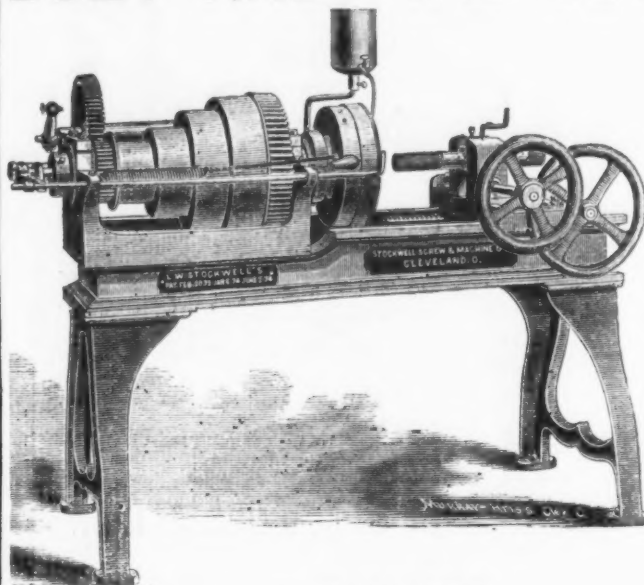
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Patent Improved

HORSE CLIPPERS.

The cutting parts are made of the very best English Cast Steel. The upper knife passes over two teeth. There is a protecting plate which gives the Clipper great strength. The iron parts of the handles are all wrought, not malleable, iron, and adjusted so that there is no danger of the handles getting broken. Every Clipper is carefully examined before leaving the factory. Quick and easy working can be guaranteed.

BOLT AND PIPE CUTTER.



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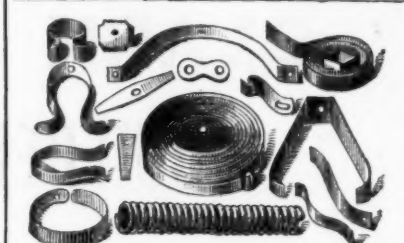
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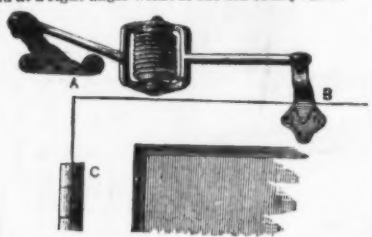
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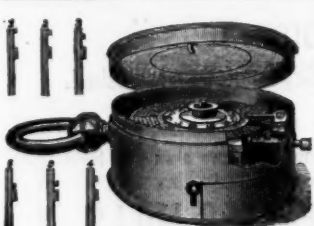
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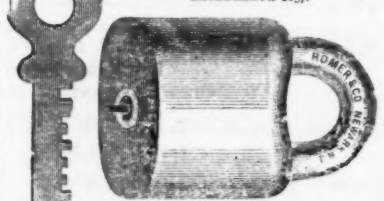
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Used extensively for lining steam pipes and
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HOES.**

FIELD HOE.

SPROUTING 4 in. wide,
HILLING 6 in. wide.

These Hoes have been in use for the past five years, and have given entire satisfaction, and with
new and improved machinery we are prepared to offer them to the trade at GREATLY REDUCED
PRICES, and **WARRANT EVERY HOE.**

The Blades are of BEST QUALITY SOLID CAST STEEL, of uniform temper, easily sharpened,
and will retain a keen cutting edge.

The Eyes are of Malleable Iron, oval in shape, with a square shoulder fitting close to the steel,
which prevents any strain or wear on the rivets.

The reputation of these Hoes is so well established that with the REDUCTION IN PRICE to about
that of an ordinary PLATED HOE the sale will be largely increased.

The Sprouting or Grubbing Hoe is of a heavier gauge steel, and is extensively used in the South and
West and growing rapidly in favor, and superseding the English Hilling Hoes, the difference in price
being very little.

REDUCED PRICE LIST.

Nos.	2.	3.	3 1/2.	4.	4 1/2.	5.	5 1/2.	6.
Width of Blade	4	5	6	6 1/2	7	7 1/2	8	8 1/2
Per dozen	\$5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75
Size of Blade	6x7	7x7	7x8	7x9	7x10	7x11	7x12	7x13
Lynchburg Pattern Tobacco Hoe	7x16	7x16	7x16	7x16	7x16	7x16	7x16	7x16
Hilling Hoe	6x7	7x7	7x8	7x9	7x10	7x11	7x12	7x13
Sprouting Hoe	4x7	5x7	6x7	6x7	6x7	6x7	6x7	6x7
Street Scrapers with 6-foot Handles	13x6	13x6	13x6	13x6	13x6	13x6	13x6	13x6
Trowel Hoe, Triangular Shaped	6x6	6x6	6x6	6x6	6x6	6x6	6x6	6x6
Hoes of any desired pattern made to order.								

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Sole Manufacturers,

Office, No. 5 German St., BALTIMORE, MD.

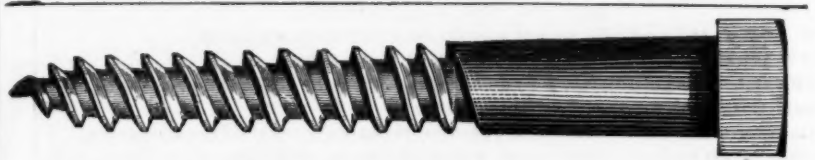
A Few Testimonials from Parties who Sell Lockwood's Steel Hoes.

BALTIMORE, Sept. 19, 1878.
Kimball Shovel Co.—GENTLEMEN: We have been selling the Lockwood Hoes for several years, and
so far as we know they have given entire satisfaction to our customers, and doubt not that with your
contemplated reduction of list to that of Planters' Half Bright, and a discount to make them net about
same as Planters' Hoes, our sales will be largely increased. Respectfully,
PENNIMAN & BRO., Importers and Wholesale Dealers in Hardware.

RICHMOND, VA., Sept. 15th, 1878.
GENTLEMEN: We reply with pleasure to your request for our opinion of Lockwood Hoes, and
state that last spring we sold a larger quantity than in any previous season, and we had stock of two
other patterns of American Hoes. With us, they seem to be growing in favor year by year, and we
have sold them since they were first introduced. We have no doubt, should the quality be maintained,
with the material reduction in price you propose, they will supersede all other patterns of American
Hoes we have yet seen. Very truly,
W. S. DONNAN, SONS & CO.,
Importers and Wholesale Dealers in Hardware.

LYNCHBURG, VA., Sept. 13th, 1878.
GENTLEMEN: We have been selling Lockwood Hoes for several years, with great satisfaction and
increasing demand, and think if you reduce the price as you suggest there will be no further difficulty
in making increased sales. Yours respectfully,
SHAFFER & ROBERTS,
Hardware Dealers.

DANVILLE, VA., February 21st, 1878.
T. B. Lockwood, Esq.—DEAR SIR: Yours of 15th inst to hand, and we take pleasure in saying that
we have sold your Hoes ever since you commenced making them, and in all cases they have given en-
tire satisfaction, and are all you claimed for them. We expect to do a good trade in them this season.
Yours truly,
J. E. SCHOOLFIELD & CO., Hardware Dealers.

**WM. H. HASKELL & CO.**

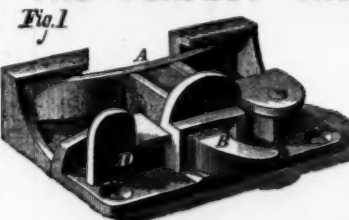
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STEAM PUMP
 Manufacturers,
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Knowles' Patent Improved Mining Pumps.
 For draining COPPER, LEAD, GOLD, SILVER, IRON or COAL MINES.
 AT THE CENTENNIAL EXHIBITION Five Medals of Honor were awarded these Pumps for superiority.
 Arranged with Special Reference to Working Water Containing Dirt, Gritty Matter or Acid.
 Pumps of capacity of over one million gallons per day are now delivering water through 600 feet vertical column, working entirely without shock or jar, the entire stoppages of Pump aggregating less than twelve hours per year.
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 This differs from any Pump of its class by doing away with a sliding box or strap, and supplying the places of the same by a hardened steel roller and steel pin. By this construction a great amount of friction is avoided. It is durable, handy and cheap. Anyone of ordinary intelligence can successfully operate it. Prices range from \$45 upwards.
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New and Improved Peerless Wringer,
 Which, in addition to the Highest Possible Finish, combines the following
POINTS OF EXCELLENCE:
 Solid White
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 Strongest
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 Nothing can get out of order and be broken. Warranted double the capacity of any Purchase Gear Wringer.
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 Rope and Iron Strap of all kinds. Lignum vitae Wood for Ten-Pin Balls.
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RUBBER BUCKETS, PUMP CHAIN AND FIXTURES
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 These Patents cover the use of the Rubber, the use of the Nut and Bolt for expanding, the use of the Tube and Valve for draining. All others are infringements, and manufacturers and dealers in infringing Buckets will be prosecuted to the full extent of the law.
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PATENT HUB FRICTION CLUTCH.
 Manufactured by the HUB FRICTION CLUTCH CO., Limited, Philadelphia.
 We claim for this device the following advantages for a perfect clutch, it having been adopted by several of the leading manufacturers of machinery and machinists' tools: It works easily but effectively. It works instantly and without noise. It is very durable, and is extremely simple and cheap, and has proven itself to be the best clutch in the market. Special arrangements can be made with leading manufacturers for the adoption of this clutch for their own tools. This clutch can and will be sold for less money than any other clutch in the market.
 For sale by GEO. V. CRESSON, Philadelphia; MORTON, REED & CO., Baltimore.
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 These Anvils are superior to the best English or other Anvils, on account of the peculiar process of their manufacture (invented and used only by this concern), and from the quality of the materials employed.
 The best English Anvils become hollowing on the face by continued hammering in use, on account of the fibrous nature of the wrought iron—causing it to "settle" under the face.
 The body of the Eagle Anvil is of crystallized iron, and no settling can ever occur; the steel face, therefore, remains perfectly true. Also, it has the great advantage that being of a more solid material, and consequently with less rebound, the piece forged receives the full effect of the hammer, instead of a part of it being wasted by the rebound, as of a wrought iron anvil. An equal amount of work can, therefore, be done on this Anvil with a hammer one-fifth lighter than that required when using a wrought iron anvil.
 The working surface is in one piece of JESUP'S BEST TOOL CAST STEEL, which, being accurately ground, is hardened and given the proper temper for the heaviest work. The horn is covered with its extremity made entirely of steel. The body of the Anvil is of the strongest grade of American iron, to which the cast steel face is warranted to be thoroughly welded and not to come off.
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 \$2.50 \$3.00 \$3.50 \$4.00 \$4.50 \$5.00 \$5.50 \$6.00 \$6.50 \$7.00 \$7.50
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FIRMENICH
Safety Steam Boiler.
 The Boiler that made the hottest, driest and greatest quantity of Steam at the Centennial Exhibition. Tubes never require cleaning or scraping. Boilers in use for four years without getting dirty.
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DODGE HAY PRESS.
 "DRAW-UP" PRESSES, For Domestic use, Drugs, &c.
LARD & TALLOW PRESSES.
 See The Iron Age of July 4, 1878.
 Axe, Hatchet, Powder and Brush Machinery.
 IRON AND BRASS CASTINGS.
 Pulleys and Shafting.
JOHN STARR,
 Hardware & Metal Broker,
 AND
 MANUFACTURERS' AGENT,
 Halifax, Nova Scotia,
 Representing in the Dominion of Canada several American Manufacturers, is ready to accept further Agencies. Satisfactory references.

E. M. BOYNTON,
 Manufacturer of all kinds of
 First-Class Saws, Saw Frames, Cross-Cut Handles, Tools, Files, &c. Also Sole Proprietor and Manufacturer of the Genuine Patent Lightning Saw.
 80 BEEKMAN STREET, NEW YORK.
TRIAL OF THE IMPROVED LIGHTNING SAW.
 The Emperor Dom Pedro, accompanied by Director General Goshorn, Superintendent Albert, and others, visited Machinery Hall, at the Centennial on the evening of June 28th. Among other things inspected, at the invitation of E. M. BOYNTON, of New York, they witnessed a trial of the New Lightning Saw, patented March 26, 1876. Two men, with one of these saws, cut off a sound log of gum-wood, one foot extreme diameter, in seven seconds, or at the rate of a cord of wood in five minutes. Messrs. Corliss, Morell, Lynch, and other members of the commission witnessed the trial and timed the cutting. The Emperor remarked, That was fast, very fast cutting. Last evening the Emperor made another examination of the saw.—Philadelphia Press, June 30.

"BOYNTON'S SAWS were effectually tested before the judges at the Philadelphia Fair, July 6th and 7th. An ash log, eleven inches in diameter, was sawed off, with a four-and-a-half-foot lightning cross-cut, by two men, in precisely six seconds as timed by the chairman of the Centennial Judges of Class Fifteen. The speed is unprecedented, and would cut a cord of wood in four minutes. The representatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, England, and several other countries, were present, and expressed their high appreciation."
 Received Medal and Highest Award of Centennial World's Fair, 1876.
 \$1000 Challenge was prominently displayed for six months, and the numerous saw manufacturers of the world dared not accept it, or test in a competition so hopeless.

WM. SPRAGUE & CO.,
 Manufacturers of
SPRAGUE'S IMPROVED Steam Engine Piston.
 The rings are expanded without removing the cylinder head. Guaranteed to save 10 per cent. over any now in use. Special attention given to repairing, improving, &c. Send for circular and price list.
 698 and 699 Filbert St., Philadelphia

Hyatt's Patent Slot Bolt.
 Patented Jan. 29th, 1878.
 For Fastening Window Screens, Cabinet Ware, &c.
 We call the attention of the trade to these Wrought Brass Bolts as being the best and cheapest in the market. Sizes, two inches and upward, both plain and neck bolts. Two screws (as shown in the cut) fasten the bolt and bed-plate to the wood; no others are required, thus effecting a great saving in screws and producing a strong, handsome and cheap Bolt. Price list furnished on application.
BRASS GOODS MFG. CO.,
 Sole Manufacturers, 280 Pearl St., New York.
 We also manufacture all kinds of Brass Goods, Plate Escutcheons, Drop Hinges, Turnbuckles for Door Knobs, Brass Labels, Patent Mirror Business Cards, &c.

NEW IRON TACKLE BLOCKS.

Norcross Patent.



Galvanized Malleable Iron Shell and Sheave, Steel Hooks, Steel Pins.

Superior to Wood Blocks on account of not Checking and Cracking.

The Strongest, Lightest, Easiest Running and most Durable Block yet produced.

Send for sample and price list of same to



Providence Tool Co.,
PROVIDENCE, R. I.

Or to J. H. Work, 13 Pearl St., Boston, Mass.; S. H. & E. Y. Moore, 68 Lake St., Chicago, Ill.; Henry B. Newhall, 11 Warren St., N. Y.

THE PENFIELD BLOCK WORKS, Lockport, N. Y.

HENRY B. NEWHALL, Agent, 11 Warren St., New York.

BLOCKS

THE PENFIELD BLOCK WORKS, Lockport, N. Y.

THE H P HORSE NAIL CO.,

Cleveland, Ohio.

These Nails

are manufactured from the

Best Selected Stock.

[Send for circulars showing dis-

counts.



These Nails

are

Guaranteed to be Equal

to the best in the market, and are

sold at greatly reduced rates.

5d 26c. 6d 23c. 7d 21c. 8d 20c. 9d 19c. 10d 18c.

NORTHWESTERN

HORSE NAIL CO.

ESTABLISHED IN 1869.

Hammered & Finished Horse Nails.

We offer our Finished Nail to the trade with the confidence that it has no equal in the market. It is the genuine "Northwestern" Nail, Finished, and we give it our unequalled guaranty.

Office and Factory, 56 to 68 Van Buren St., Chicago.

A. W. KINGSLAND, Secretary.

Our agents, Graham & Haines, 213 Chambers Street, New York, carry a full line of our goods, and will be pleased to serve you at Factory prices.

GLOBE NAIL COMPANY,

MANUFACTURERS OF

Pointed Polished & Finished Horse Shoe Nails.

Recommended by over 20,000 Horse Shoers.

All nails made from best NORWAY IRON, and warranted perfect and ready for driving. Orders filled promptly and at lowest rates by

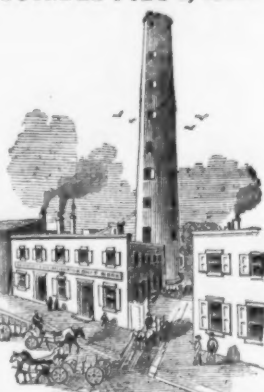
GLOBE NAIL CO., Boston, Mass.

THORNE, DeHAVEN & CO., Drilling Machines,

21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction. RADIAL DRILLS. Self-feed—Large Adjustable Box Table. VERTICAL DRILLS. Self-feed. MULTIPLE DRILLS. 2 to 20 Spindles. HORIZONTAL BORING AND DRILLING MACHINES. HAND DRILLS. CAR BOX DRILLS. SPECIAL DRILLS. For Special Work.

The Oldest Shot Tower in America.
FOUNDED JULY 4, 1808.



THOMAS W. SPARKS,

Manufacturer of

American Chilled Shot,
Rivalling the English and all Others.

STANDARD DROP & BUCK SHOT
AND BAR LEAD.

121 Walnut Street, Philadelphia.



THE RIVET BUCKET CO.,
N. HAWKINS, Sec'y.
84 & 86 Franklin St., CHICAGO.

WESTON DYNAMO-ELECTRIC MACHINE
NICKEL.

The rapid increase in the use of Nickel-Plating owing to the introduction of the Weston Machine and the very low price of nickel material, enables us to give greatly reduced estimates for complete outfits.

We are furnishing outfits specially adapted for Stove Work, giving a pure white deposit on plain or metal surfaces.

Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., &c., \$250.

We beg to refer to the following Stove Manufacturers among 500 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., Fuller, Warren & Co., Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto, and many others.

INFRINGEMENTS.

We call attention to infringements of the Weston Machine, in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

CONDIT. HANSON & VAN WINKLE
Sole Agents **NEWARK, N. J. U. S. A.**
ENGLISH AGENCY: 18 Caroline Street, Birmingham.

JOHN W. QUINCY,

98 William Street, New York.

NICKEL.

Solder, Lead, Block Tin, and other Foundry Metals. Cut Nails.

Yates Nickel Works,

136th St., near Third Avenue.

YATES & ELY, Proprietors.

Our Pure Nickel Anodes dissolve like a silver plate without crumbling. Their purity makes them especially valuable for plating jewelry, or where extra whiteness and finish are required.

A. T. COLT,

Nickel-Platers' Supplies.

ARMATURE ELECTRO-PLATERS' MACHINES.

PURE NICKEL in grain, ROUGE, COMPOSITION

EMERY, TRIPOLI, CYANIDE POTASSIUM

CORAL, metallic & sulphate, BATTERIES & MATERIALS,

VIENNA LIME, CROCIUS, BUFFING LATHES, &c.

Silver (999 pure) granulated or rolled. Gold and Platinum rolled to order. 47 Beekman St., N. Y.

NICKEL PLATING.

PHILADELPHIA.

37 1/2 N. 7th St.

WORKS.

METALLIC SHINCLIPS.

We call the attention of all parties interested in Roofing, and the owners of large buildings, to the above article. It is superior to slate, cheaper, fire proof, about one-fourth the weight, lays much closer, therefore is storm proof, cannot crack, &c. Any carpenter can put them on. Send for description and Price List to Iron Clad Manufacturing Co., 50 Greenpoint Av., Brooklyn, & D. P. O. Box, 558, N. Y. City.

NONESUCH

Self Locking

Burglar Proof

Window Locks.

Cheapest and best in the market. Send for description and price list, &c., to

FRED. J. HOYT

Patented July 16th, 1877. 733 Broadway, N. Y.

BOSTON.

Reported by Macomber, Bigelow & Douse, 156 to 164 Oliver St.

Anvils.—"Eagle American".....\$ 20 00

Apple Parers.—Reading.....\$ 20 00

Reading.....\$ 20 00

Alken's Tools.....\$ 20 00

Avail & Vice.....\$ 20 00

Augurs & Bits.—Snell's Auger.....\$ 20 00

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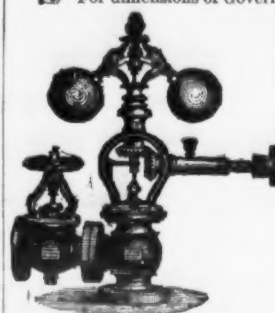
Plated Ware.—Rogers & Bro.....\$ 20 00

Machinery, &c.**THE JUDSON GOVERNOR.**

It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in accuracy and durability—the main essentials—we guarantee it shall do more.

Reduced Price List, FEBRUARY 1, 1877.

For dimensions of Governor, see Illustrated Price List.



THE JUDSON PATENT

Improved Steam Governor.

No Charge for Boxing or Cartage.

JUNIOR JUDSON & SON, Rochester, N. Y.

Size, Inch.	Plain.	Bright.	For.	Stop.
1	\$16.00	\$18.00	\$1.00
1 1/4	18.00	20.00	1.00
1 1/2	20.00	22.00	2.00	\$5.00
1 3/4	23.00	25.00	2.25	6.00
2	26.00	30.00	2.50	8.00
2 1/4	31.00	35.00	2.75	10.00
2 1/2	36.00	41.00	3.25	12.00
2 3/4	40.00	45.00	3.50	14.00
3	45.00	51.00	3.75	16.00
3 1/4	50.00	57.00	4.25	19.00
3 1/2	55.00	62.00	4.50	23.00
3 3/4	60.00	68.00	5.00	28.00
4	65.00	73.00	5.50	34.00
4 1/4	70.00	78.00	6.00	40.00
4 1/2	75.00	83.00	6.50	46.00
4 3/4	80.00	88.00	7.00	54.00
5	85.00	93.00	7.50	62.00
5 1/4	90.00	98.00	8.00	70.00
5 1/2	95.00	103.00	8.50	79.00
5 3/4	100.00	108.00	9.00	88.00
6	105.00	113.00	9.50	98.00
6 1/4	110.00	118.00	10.00	108.00
6 1/2	115.00	123.00	10.50	118.00
6 3/4	120.00	128.00	11.00	128.00

PRESSES, DROP HAMMERS, DIES, And Other Tools

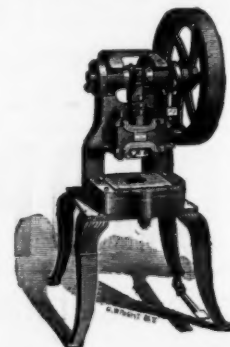
FOR THE MANUFACTURE OF ALL KINDS OF

Sheet Metal Goods, DROP FORGINGS, &c.

The Stiles & Parker Press Co., MIDDLETOWN, CONN.

BLISS & WILLIAMS,

Manufacturers of all kinds of

**Presses, Dies and Special Machinery**

FOR WORKING SHEET METALS, &c.

Fruit and other Can Tools.

167 to 173 Plymouth St., corner of Jay, Brooklyn, N. Y., and Paris Exposition, 1878.

Chas. W. Ervien & Co.,
IRELAND ST.
Kensington, PHILAD'A
BUILDERS OF
STATIONARY & MARINE
ENGINES, BOILERS
SHAFTING, GEARING,
AND
MILL WORK
GENERALLY.
Special Machinery
BUILT TO ORDER.

Vertical
AND
Horizontal
Engines,
Of New and Heavy De-
signs, from 2 to
100 H. P.,
on hand or in process of
erection.

Machinery, &c.

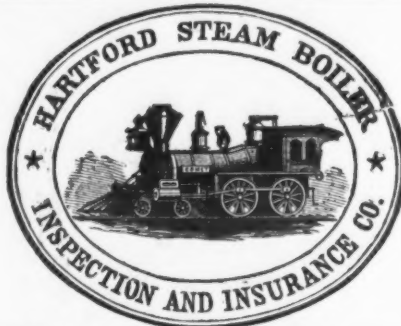
Established 1848.

WM. SELLERS & CO.,

600 Hamilton Street, PHILADELPHIA,

**Engineers, Iron Founders and Machinists.
RAILWAY SHOP EQUIPMENTS.**Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters
Are of Improved and Patented Construction.Railway Turning and Transfer Tables,
SHAFTING & MILL GEARING, a specialty.**Pivot Bridges.**

GIFFARD'S INJECTOR—IMPROVED, SELF-ADJUSTING.



Issues Policies of Insurance after a careful inspection of the Boilers.

COVERING ALL LOSS OR DAMAGE TO

Boilers, Buildings and Machinery.

ARISING FROM,

STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS.

Full information concerning the plan of the Company's operations can be obtained at the

COMPANY'S OFFICE, HARTFORD, CONN.,

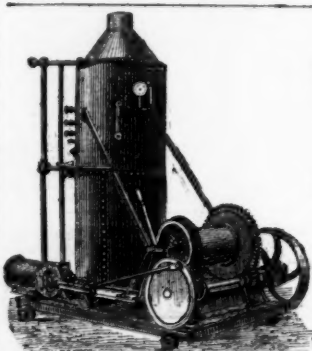
or at any Agency.

J. M. ALLEN, Pres. W. B. FRANKLIN, Vice-Pres. J. B. PIERCE, Sec.

Board of Directors:

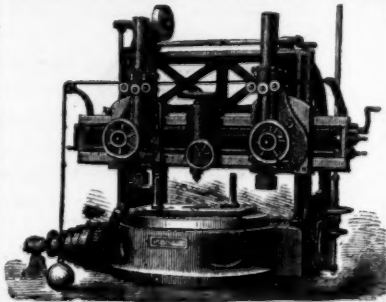
J. M. ALLEN, President.
LUCIUS J. HENDEE, Pres't Etina Fire Ins. Co.
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ard.

GEN. WM. B. FRANKLIN, Vice Pres't Colt's Pat. Fire
Arms Mfg. Co.
GEO. CROMPTON, Crompton Loom Works, Worcester
WILLIAM ADAMSON, of Baeder, Adamson & Co.,
Philadelphia.
HON. THOS. TALBOT, Ex-Governor of Mass.
NEWTON CASE, Case, Lockwood & Brainard, Hartford
WILLIAM S. SLATER, Cotton Manufacturer, Providence, R. I.
NELSON HOLLISTER, of State Bank, Hartford.
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**A. J. DAVIS & CO.,
Patent Friction Hoisting Engines**

For Mines, Quarries, Dock Building &c.

MANUFACTURERS OF

SHAPERS, DRAIN PIPE MACHINES, BAG AND
SATCHEL MACHINERY,
Steam Engines, Wire Drawing
Machinery, &c., &c.69 N. J. R. Avenue, Newark, N. J.
Correspondence solicited.**BORING AND TURNING MACHINES.**Special Pulley Turning Machinery,
Engine Lathes, Iron Planers,
Universal Radial Drilling Machines,
Hydrostatic Presses,
Car Axle Lathes and Wheel Bore.Latest designs and patterns. Prices very reason-
able.NILES TOOL WORKS,
Hamilton, Ohio.**THE SWIFT MILL.**

ESTABLISHED 1845.

The annexed cut shows one of the many styles of Coffee Mills of
our manufacture, especially adapted to Grocers' use and all retailers
of coffee. They are highly ornamental, and workmanship of the very
best. We make more than 30 styles.

ALSO LANE'S PORTABLE COFFEE ROASTER

Will roast 30 to 40 lbs. at once, and can be used as a stove at other
times. Send for descriptive list to Manufacturers.

LANE BROS., Millbrook, N. Y.

Also sold by leading wholesale houses.

Our agents, Graham & Haines, 113 Chambers St., New York,
carry a full line of our goods, and will be pleased to serve you at Fac-
tory prices.

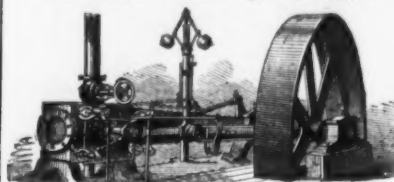
GEORGE N. PIERCE & CO.,

Buffalo, N. Y.,

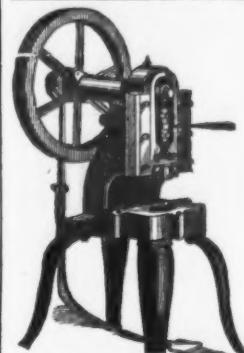
Sole Manufacturers of the

Most Perfect Funnel Hod.The "Boss" Coal Hod was patented February 23, 1878. It
is made of best refined iron; bottoms double seamed and
riveted, and is so constructed that the mouth cannot become
choked while discharging coal. Suitable for stove, grate,
range or furnace fires.Special prices quoted to the trade and catalogue furnished
on application.**Machinery, &c.****Corliss Engine Builders**

With Wetherill's Improvements.

Engineers, Machinists, Iron Founders
and Boiler Makers.

ROBT. WETHERILL & CO. Chester Pa.

A. H. MERRIMAN,
Patent Power
PUNCHING PRESSES,
West Meriden, Conn.

ESTABLISHED 1844.

**JOSEPH C. TODD,
Engineer & Machinist**Flax, Hemp, Jute, Rope, Oakum,
and Bagging Machinery,
Steam Engines,
Boilers, etc.

I also manufacture

BAXTER'S

New Portable Engine

of 1877, of one horse-power, com-
plete for \$125.

2 Horse Power.....\$225 1200

2 1/2 Horse Power.....\$350 1700

3 Horse Power.....\$475 2100

Can be seen in operation at my
store. Send for descriptive cir-
cular and price. Address

J. C. TODD,

10 Barclay St., N.Y., or Paterson, N.

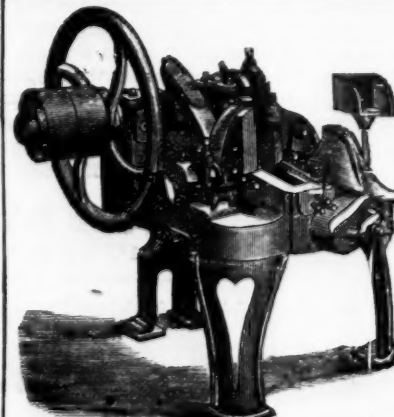
**RIVAL
STEAM PUMPS**

THE
CHEAPEST
AND THE
BEST
FOR
HOT & COLD
WATER.
\$45.00
UPWARDS.

IS
SIZES
MANUFACTURED BY
JOHN H. MCGOWAN & CO.
CINCINNATI

True Merit and Excellence is the Basis of all Success.
THE EUREKA STEAM AND HYDRAULIC PACKING.

TRADE MARK.

SYMMONS & CO., 120 Exchange Place, Phila.,
Sole Manufacturers.The results of a long series of experiments
made with a view of meeting all the re-
quirements of a Perfect Packing. And we assert
without reservation that it is the best article of
its kind yet invented. It is made of the best
materials, is elastic, pliable, and does not be-
come hard by use, consequently is easily taken
out when renewal is necessary. It has a rubber
center, rectangular in form, covered with a
series of braids of linen, between which is placed
a lubricative compound superior to anything
ever before used for the purpose, and contains
nothing that can in any manner cut, bite or gum
the rods, no matter how long run. It has thus
far received the highest praise of every engineer
who has used it, and we have received many tes-
timonials from the proprietors of Mills, Fac-
tories, Iron Works, &c., that it is the most dura-
ble, efficient and cheapest packing they ever
used. All we ask is a fair trial, knowing it will
convince better than any words of ours. Orders
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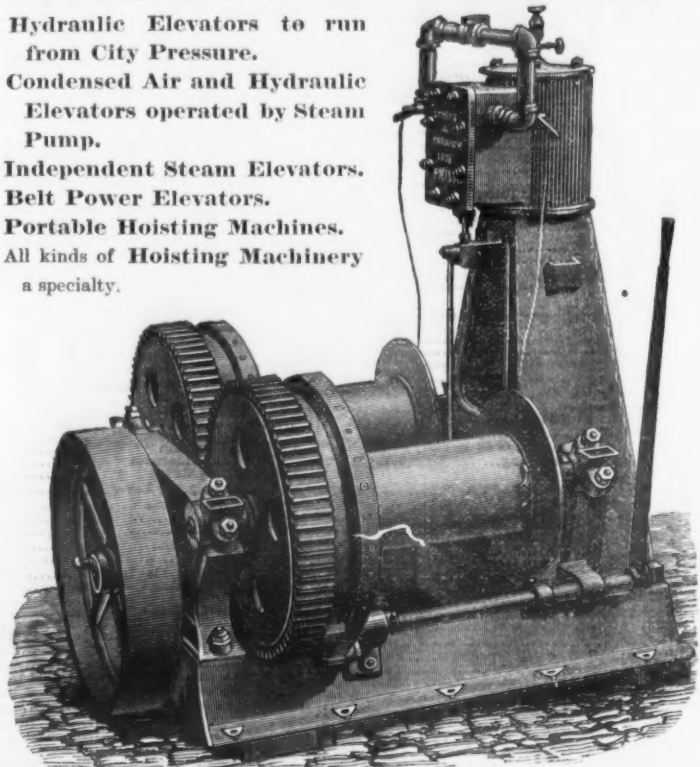
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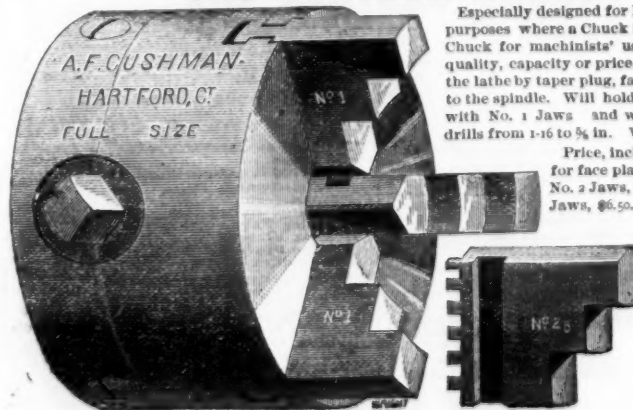
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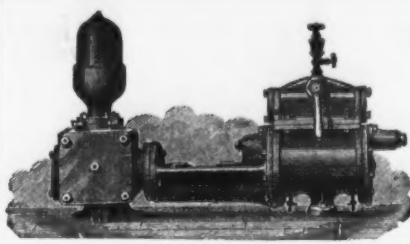
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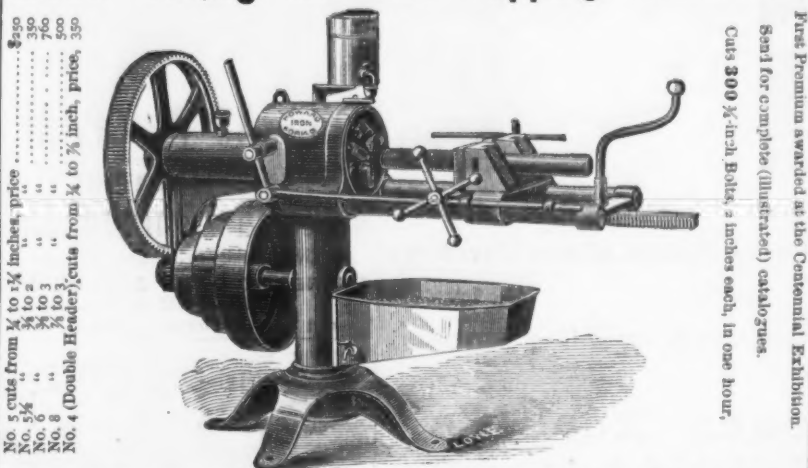
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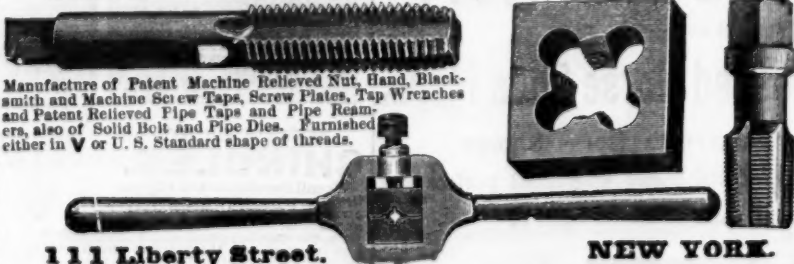
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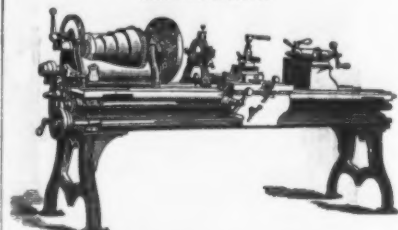
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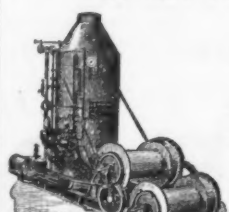
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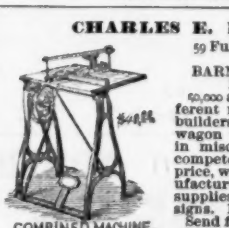
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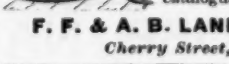
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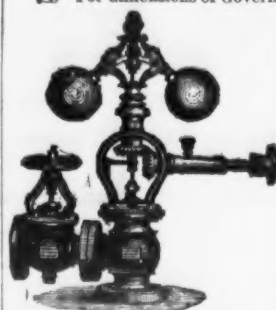
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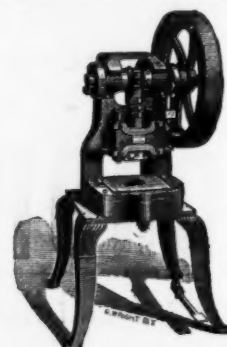
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1 3/4	31.00	33.00	2.75
2	36.00	38.00	3.00
2 1/4	40.00	42.00	3.25
2 1/2	45.00	47.00	3.50
2 3/4	50.00	52.00	3.75
3	55.00	57.00	4.00
3 1/4	60.00	62.00	4.25
3 1/2	65.00	67.00	4.50
3 3/4	70.00	72.00	4.75
4	75.00	77.00	5.00
4 1/4	80.00	82.00	5.25
4 1/2	85.00	87.00	5.50
4 3/4	90.00	92.00	5.75
5	95.00	97.00	6.00
5 1/4	100.00	102.00	6.25
5 1/2	105.00	107.00	6.50
5 3/4	110.00	112.00	6.75
6	115.00	117.00	7.00
6 1/4	120.00	122.00	7.25
6 1/2	125.00	127.00	7.50
6 3/4	130.00	132.00	7.75
7	135.00	137.00	8.00
7 1/4	140.00	142.00	8.25
7 1/2	145.00	147.00	8.50
7 3/4	150.00	152.00	8.75
8	155.00	157.00	9.00
8 1/4	160.00	162.00	9.25
8 1/2	165.00	167.00	9.50
8 3/4	170.00	172.00	9.75
9	175.00	177.00	10.00
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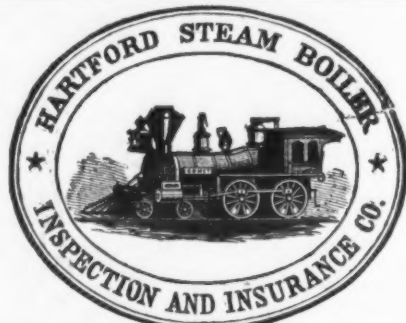
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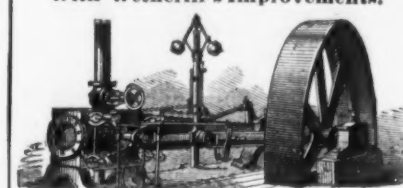
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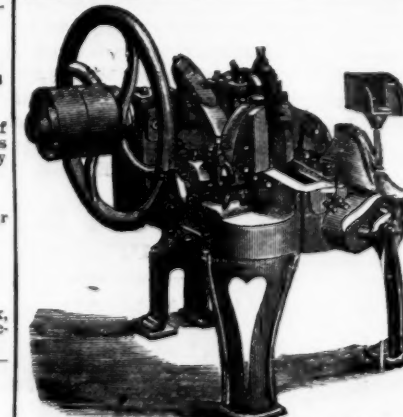
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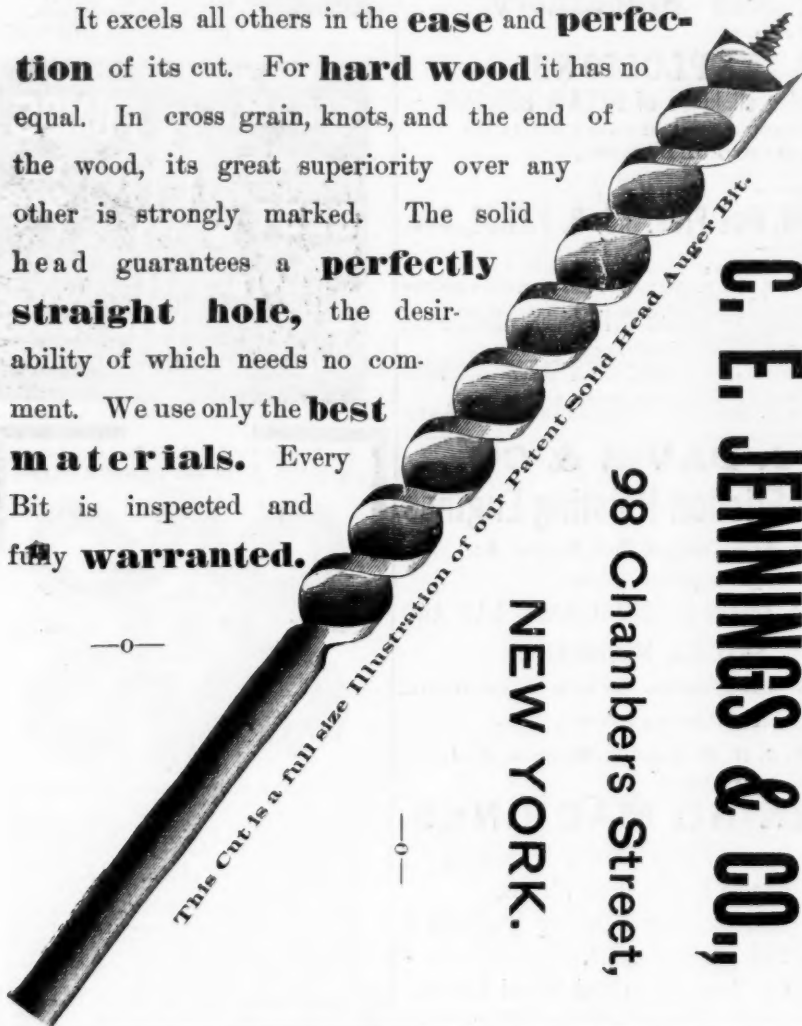
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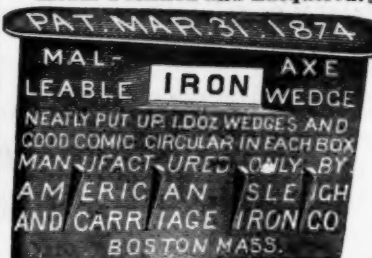
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